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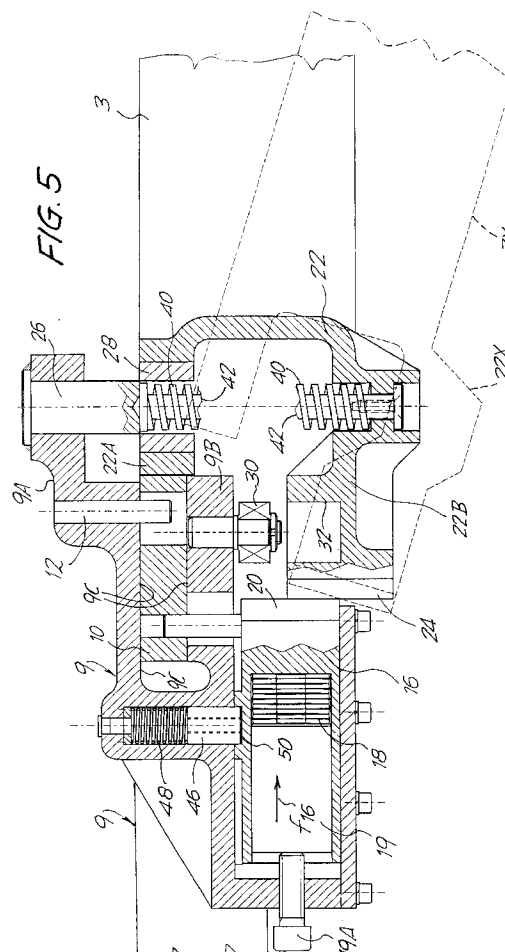
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(54) **Emergency release device to enable a level crossing barrier to yield in case of horizontal stress or impact.**

(57) The barrier (3, 22) is pivoted on a supporting body (9) by means of two separated coaxial vertical pins (26, 28); the axial displacement of the barrier with respect to the said pins (26, 28) and its release from them are prevented by a bolt (10) which is disengaged at the moment of an initial angular yielding of the barrier about the said pins (26, 28), so that the barrier (3, 22) is released axially from the two vertical pins (26, 28); the barrier (3, 22) and the said supporting body (9) form fork-shaped arms (9A, 9B; 22A, 22B) which interact with each other, with the vertical pins (26, 28), and with the bolt (10).



The invention relates to a device which is fitted between the barrier of a level crossing - or other equivalent installation - and its operating unit, and which is capable of releasing the barrier at the moment at which it is subjected to a horizontal stress or impact.

The barrier is pivoted on a support with two separated coaxial angular restraining means, and its axial displacement with respect to the said restraining means and its release from them are prevented by a bolt which is disengaged at the moment of an initial angular yielding of the barrier about the axis- of the said restraining means, so that the barrier is released axially from the two angular restraining means and thus from the support.

It will be advantageous to provide elastic means capable of acting in the axis of the said angular restraining means to facilitate release. These elastic means may consist of a helical spring.

In practice, the device may comprise a barrier supporting body pivoted with a horizontal axis on an operating unit of the barrier; the said body and the end of the barrier connected to it are engaged with each other by angular restraining means which comprise a pin and a rolling bearing interacting with a curved track with its centre in the axis of the angular restraint; the bolt is guided slidably in the said body and is normally positioned to prevent displacements of the end of the barrier with respect to the supporting body along the axis of the angular restraint.

The device may comprise, on the end of the barrier, which is angularly movable about the axis of the said angular restraint, a first shaped profile, and in combination with the said bolt a second profile corresponding to and interacting with the said first shaped profile; the said first and second shaped profiles are capable of causing - on an initial angular displacement of the barrier - the sliding of the bolt and thus the release of the barrier from the supporting body. In practice, the said second shaped profile may be formed by a slide which is slidable in the said supporting body and is connected to the bolt by a drive pin.

One of the said shaped profiles may be spring-loaded to define the normal position of the barrier and to give it a predetermined load. This spring loading may be combined with the said slide.

The shaped profiles may advantageously be symmetrical, so as to act after thrusts or impacts in opposite directions on the barrier.

According to a possible embodiment, the said vertical pin is integral with one arm of the said supporting body and points downwards, and the other angular restraining means is a rolling bearing projecting downwards from the said supporting body and housed in a curved track, with its centre in the axis of the pin, formed in the end of the barrier; the disposition of the bearing with the corresponding curved track and/or of the pin may also be reversed.

An elastic retaining peg may interact with the said slide which moves the bolt, or with the bolt itself.

The invention will be more clearly understood from an examination of the description and the attached drawing, which shows a non-restrictive practical example of the invention. In the drawing,

Fig. 1 is a vertical sectional view of the emergency release device according to the invention, in the normal position of the level crossing barrier; Figs. 2, 3 and 4 are horizontal sections through II-II, III-III and IV-IV in Fig. 1; and

Fig. 5 is a sectional view similar to Fig. 1, but illustrating a configuration of the release of the barrier from a supporting body.

According to the illustrations in the attached drawing, 1 indicates a turret forming an operating unit, on which the level crossing barrier indicated in a general way by 3 is ultimately pivoted. 5 indicates in a general way the horizontal pivot axis for the operations of raising and lowering the barrier. The device described herein, indicated in a general way by 7, is designed to permit the release of the barrier 3 from a barrier supporting body 9 pivoted at 5 on the turret 1; release must be provided when the barrier receives a thrust or impact in a horizontal direction shown by one of the arrows f0 in Fig. 2.

The device 7 comprises the said body 9, which is extended to form arms 9A, 9B and to form a slide housing 9C for a bolt 10 which can slide in the direction of the double-ended arrow f10. The bolt may be guided in particular by means of a key 12 engaged with the body 9; the bolt 10 can also be displaced in the direction of the double-ended arrow f10 by a peg 14 carried by a slide 16 which can slide in the same direction as the arrow f10 on the body 9. This slide 16 is acted on by elastic means 18 such as Belleville washers or similar, which bear on a block 19 whose position is adjustable by an adjusting screw 19A. The slide 16 has a projecting symmetrical shaped profile 20 for the purposes stated below.

The barrier 3 is integral with a terminal element 22 which - in vertical section - is substantially in the shape of a fork, with arms 22A and 22B; in the normal operating position, the arms 22A and 22B of the terminal element 22 of the barrier 3 are below and in contact with the arm 9A and the lower surface of the arm 9B of the support 9. The arm 22B has a symmetrical profile 24 capable of interacting with the profile 20.

The supporting body 9 and the terminal element 22 are held together angularly in a vertical axis A-A in the way stated below. A pin 26 provided in the upper part is engaged with the upper arm 9A of the supporting body 9; the pin 26 is housed slidably and rotatably in a bush 28 carried by the arm 22A of the terminal element 22. A second angular restraint, capable of withstanding the cantilever thrust of the projecting barrier 3, consists of a bearing 30 projecting down-

wards from the body 9, and housed in curved track 32 formed in the element 22, along which track the bearing can roll at the moment of angular displacement of the barrier 3 and of the terminal element 22 about the axis A-A; the bearing, by its pressure on the external surface of the track, opposes the effect of the cantilever load of the barrier 3. The bolt 10, which slides in the housing 9C of the supporting body 9, can interact with the upper arm 22A of the terminal element 22 integral with the barrier 3, as seen in Fig. 1, when and while the bolt 10 is impelled by the springs 18 of the slide 16 - through the peg 14 - in the direction indicated by the arrow f16. In these conditions, the pin 26 and the bearing 30 with the track 32 form a vertical pivot axis A-A for the barrier 3 and for its terminal element 22. The elastic thrust of the springs 18 which act on the slide 16 and consequently on the shaped profile 20 provides an elastic centring stress for the interaction of the two profiles 20 and 24 consequently a stress causing the barrier 3 to remain in its regular position until it is acted on by a lateral thrust in the direction of one of the arrows f0.

In normal conditions, in the absence of a thrust, the bolt 10 interacts with the arm 22A of the terminal element 22 and the whole assembly remains in the condition of normal operation of the level crossing barrier in the lowered position. When a lateral thrust in the direction of f0 causes an initial rotation of the barrier 3 and of its terminal element 22 about the axis A-A of the pin 26 and of the members 30, 32, the shaped profile 24 with a V-shaped indentation applies a thrust to the corresponding shaped profile 20 in the direction opposite to that of the arrow f16 and against the elastic action of the springs 18; this causes a withdrawal of the slide 16 in the direction opposite to that of the arrow f16 and, through the peg 14, the corresponding sliding of the bolt 10 to a point at which the interaction of this bolt 10 with the arm 22A of the terminal element 22 is interrupted. The cessation of this interaction - by the withdrawal of the bolt 10 in the direction opposite to that of the arrow f16 - makes it possible for the terminal element 22 to slide axially by its own weight along the axis A-A defined by the pin 26 and by the members 30, 32. To ensure this axial displacement along A-A, a compression spring 40 is provided and is wound around a rod 42 which is slidably guided in the body 22 and, under the pressure of the spring 40, bears on the lower end of the pin 26. This causes a vertical sliding of the assembly 22, 3 such that the arm 22A is released from the pin 26 and the bearing 30 is released from the track 32 of the arm 22B of the terminal element 22, leading to the condition shown in Fig. 5, in which there is a complete release of the terminal element 22 and consequently of the barrier 3 from the vertical pivot previously formed by the pin 26 and by the members 30, 32; being released from the supporting body 9, the barrier 3 can fall or be displaced and removed in any way

from the body 9, as indicated in broken lines by 3X, 22X.

With the device 7 as described, it is therefore possible for the barrier 3 to be rapidly and spontaneously released as a consequence of any thrust in the direction of one of the arrows f0 on the barrier 3 sufficient to cause a slight rotation about the vertical axis A-A, as is required from the device in question.

The body 9 also has formed in it a catch with a peg 46 pressed elastically downwards by a spring 48 against the slide 16 below; the slide has on its upper surface, against which the peg 46 can press, a socket 50 which the peg 46 can enter when the slide 16 has been displaced - as described previously - by the interaction of the shaped profiles 24 and 20 under the effect of the initial rotation of the barrier 3 in the horizontal direction about the axis A-A under the effect of a thrust or impact in the direction of one of the arrows f0. With the withdrawal of the slide 16 caused in this way, the socket 50 is brought next to the peg 46 which enters it with a spring action and locks the slide 16 in the withdrawn position. This enables the barrier 3 to be released from the elastic stress and also facilitates the operation of restoring the engagement of the barrier 3 with its terminal element 22 to the body 9, by means of the pin 26 and the members 30 and 32, to return the barrier to the operational condition; after this, the peg 46 can be raised with a suitable means against the action of the spring 48 so that the slide 16 is released to restore the stress by the springs 18.

It is to be understood that the drawing shows only an example provided solely as a practical demonstration of the invention, this invention being variable in its forms and dispositions without departure from the scope of the guiding concept of the invention. The presence of reference numbers in the attached claims has the object of facilitating the reading of the claims with reference to the description and to the drawing, and does not limit the scope of the protection represented by the claims.

Many variations may be made by variation of the shapes of the individual components as defined in the following claims.

Claims

1. Emergency release device to enable a level crossing barrier (3, 22) to yield in case of horizontal stress or impact, and for equivalent applications, characterised in that the barrier (3, 22) is fixed to a support (9) with two separated and co-axial angular restraining means (26; 30, 32), and its axial displacement with respect to the said restraining means and its release from them are prevented by a bolt (10) which is disengaged at the moment of an initial angular yielding of the

barrier (3, 22) about the axis (A-A) of the said restraining means, so that the barrier is released axially from the two angular restraining means and thus from the support.

2. Device according to Claim 1, characterised in that it comprises elastic means (40) capable of acting in the axis (A-A) of the said angular restraining means (26; 30, 32) to facilitate release. 5

3. Device according to Claim 1 or 2, comprising a barrier supporting body (9) pivoted with a horizontal axis on an operating unit of the barrier, and a terminal element (22) connected to the rod (3), characterised in that the said body (9) and the said terminal element (22) are angularly connected together by a pin (26) capable of sliding in a bush (28) and by a rolling bearing (30) interacting with a curved track (32) with its centre in the axis (A-A) of the angular restraint; and in that the bolt (10) is guided slidably in the said body (9) and is normally positioned to prevent displacements of the terminal element (22) of the barrier (3) with respect to the supporting body (9) along the said axis (A-A) of the angular restraint. 10
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4. Device according to one of Claims 1 to 3, characterised in that it comprises, on the terminal element (22) of the barrier (3), which is angularly movable about the axis of the said angular restraint, a first shaped profile (24), and in combination with the said bolt (10) a second shaped profile (20) corresponding to and interacting with the said first shaped profile; the said first and second shaped profiles (24, 20) being capable of causing - on an initial angular displacement of the barrier (3) - the sliding of the bolt (10) and thus the release of the barrier (3) from the supporting body (9). 30
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5. Device according to Claim 4, characterised in that the said second shaped profile (20) is formed by a slide (16) which is slidable in the said supporting body (9) and is connected to the bolt (10) by a drive pin (14). 45

6. Device according to Claim 4 or 5, characterised in that one of the said shaped profiles (24; 20) is spring-loaded (with springs 18) to define the normal position of the barrier and to give a predetermined load opposing the initial angular displacement of the barrier (3). 50

7. Device according to Claim 4 or 5 or 6, characterised in that the said shaped profiles (24; 20) are symmetrical, so as to act after thrusts or impacts in opposite directions on the barrier. 55

8. Device according to at least one of Claims 1 to 7, characterised in that the vertical pin (26) is integral with one arm (9A) of the supporting body (9) and points downwards, and the other angular restraining means is a rolling bearing (30) projecting downwards from the said supporting body (9) and housed in a curved track (32), with its centre in the axis of the pin (26), formed in the terminal element (22) of the barrier (3).

9. Device according to at least one of the preceding claims, characterised in that an elastic retaining peg (46), which may be made inoperative from the outside, interacts with the said slide (16) which moves the bolt (10), or with the bolt (10) itself.

10. Emergency release device, to enable a level crossing barrier (3, 22) to yield in case of horizontal stress or impact; the whole as described above and as represented by way of example in the attached drawing.

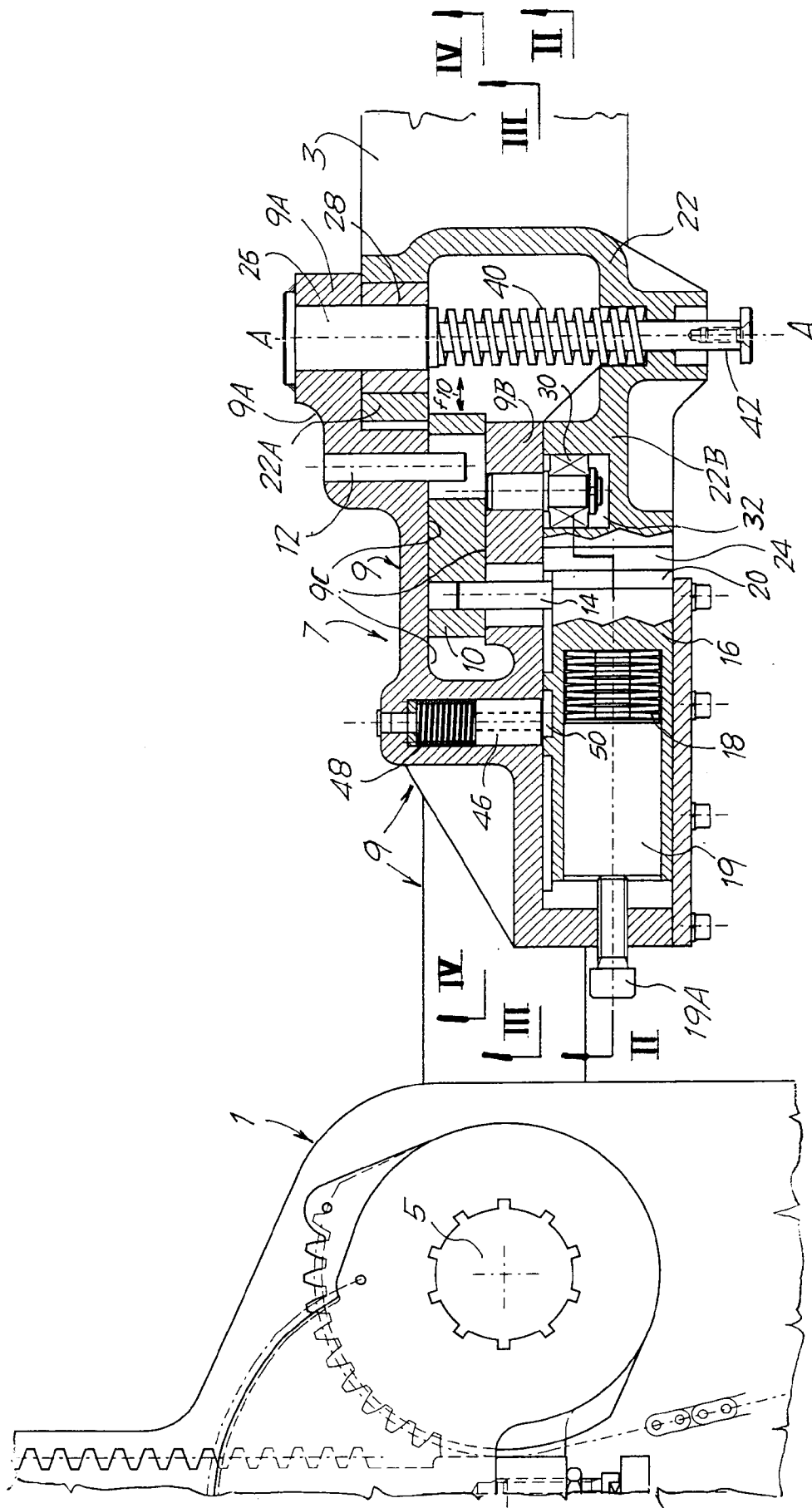
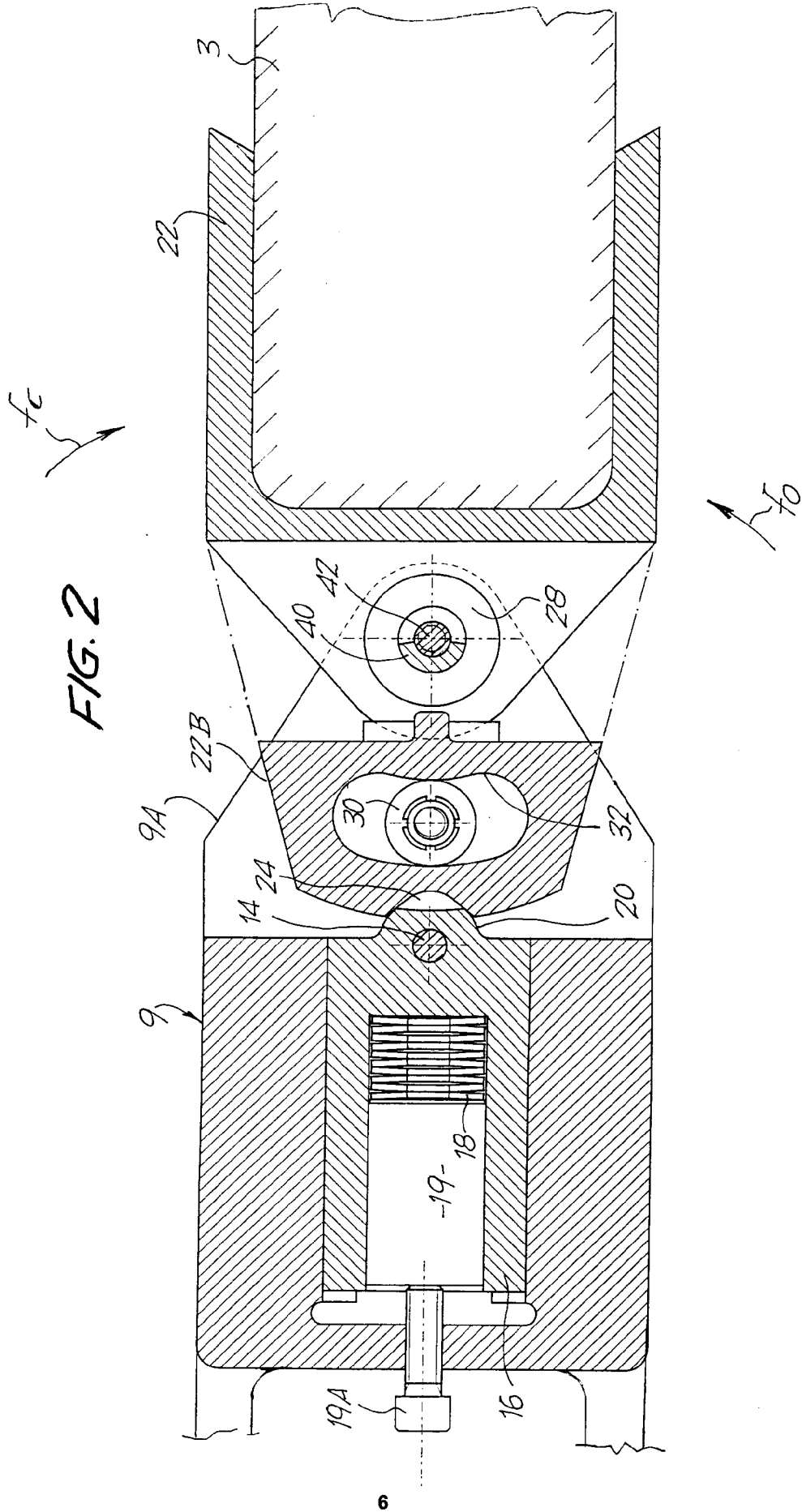
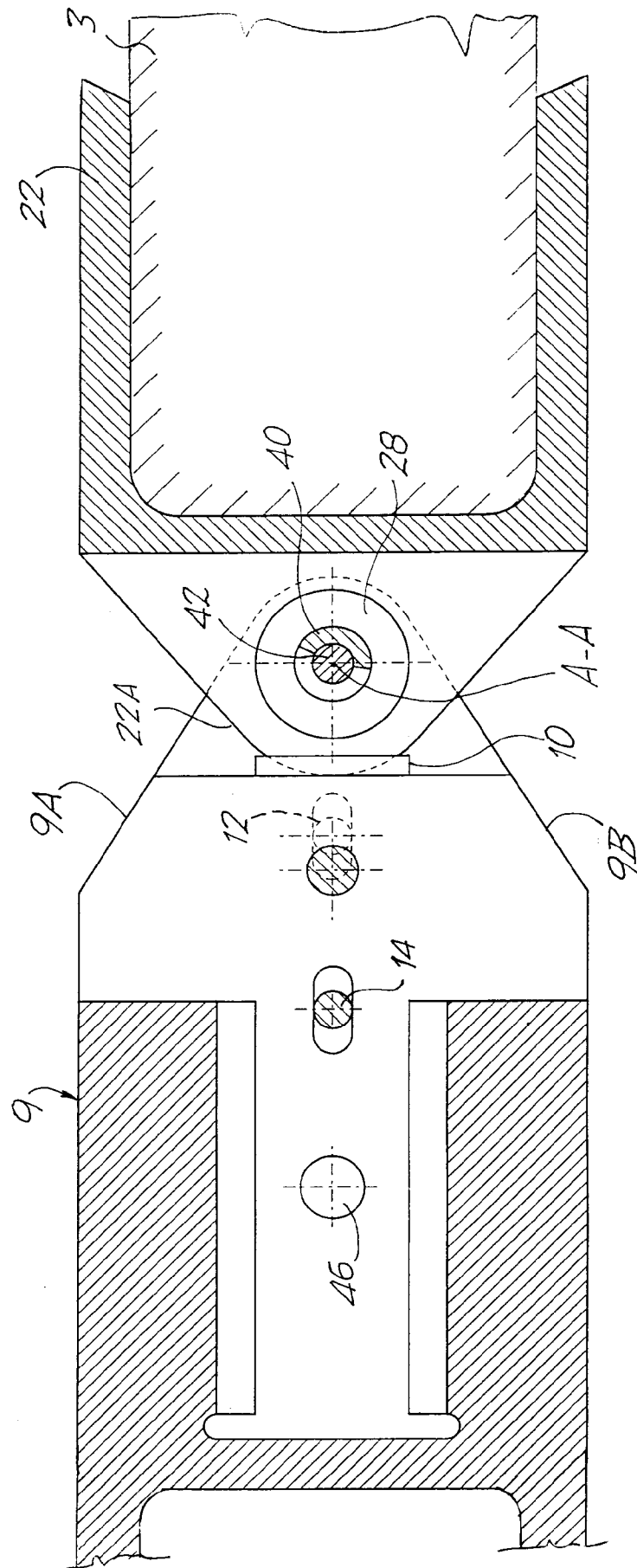


FIG. 1





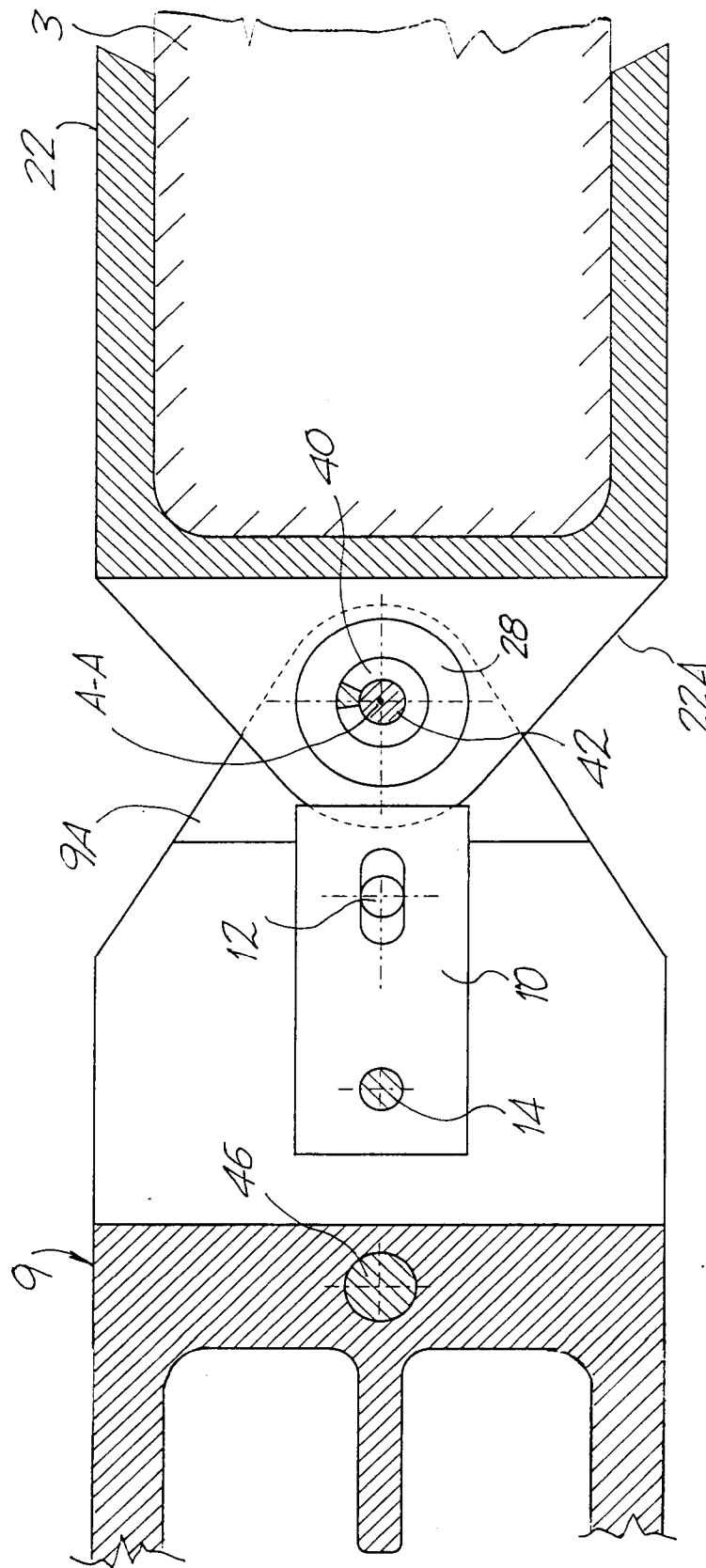
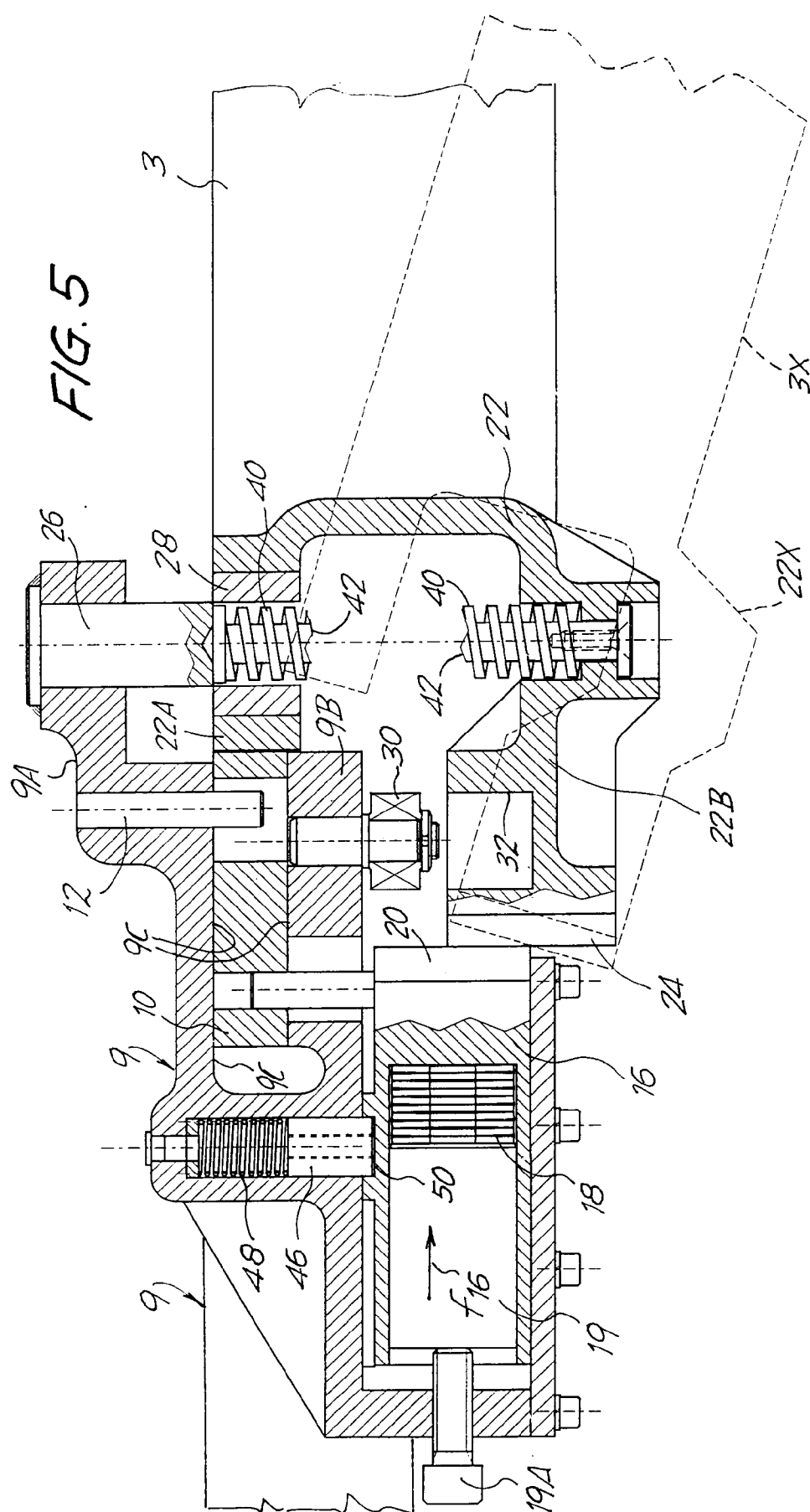


FIG. 4





European Patent
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EUROPEAN SEARCH REPORT

Application Number
EP 93 83 0311

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 Y	US-A-4 219 969 (W.O. REINITZ) * column 8, line 32 - line 52; figures 2,4,6,7 *	1,8,10 3,4	E01F13/00
X A	DE-A-17 55 548 (RAILROAD ACCESSORIES) * page 9, paragraph 2 - page 14, paragraph 2; figures 5-8 *	1,10 3,8	
Y A	DE-U-70 45 343 (SIEMENS) * page 2, paragraph 2; figures 1,3 *	3,4 1	
A	US-A-4 364 200 (C.W.E. COBB) * column 3, line 23 - line 41; figures 10,11 *	1,8	
A	US-A-4 232 484 (H. BUCHMANN) * column 7, line 9 - line 49; figure 5 *	1,9	
A	US-A-4 897 960 (T.A. BARVINEK) * column 4, line 36 - line 47; figure 7 *	2,4,6	
			TECHNICAL FIELDS SEARCHED (Int.Cl.5)
			E01F B61L
The present search report has been drawn up for all claims			
Place of search THE HAGUE		Date of completion of the search 24 November 1993	Examiner Verveer, D
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