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(54) ELASTIC ELEMENT FOR BRAKES OF GUIDED SYSTEMS

(57) Consists of an elastic element for guided system progressive brakes (brakes for elevating systems) that allows two-way brake actuation without needing intermediate parts between it and the wedging element. There is a joint in the central part and the ends behave differently depending on the direction of actuation.

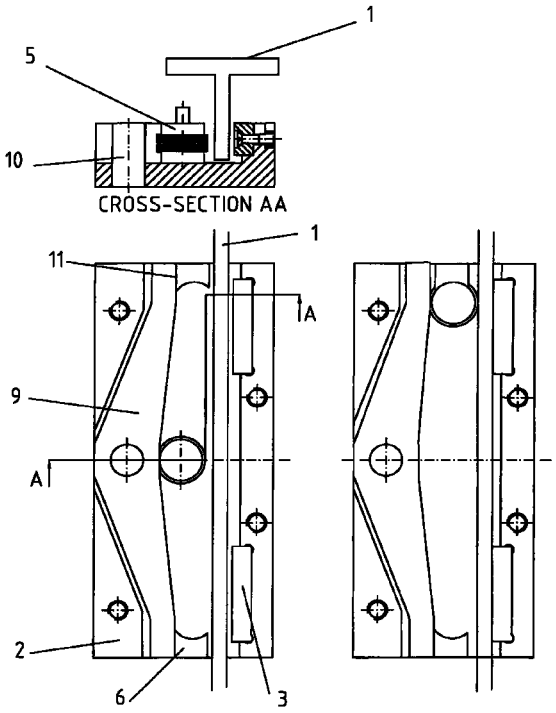


Figure 9

EP 1 061 032 A1

Description

OBJECT OF THE INVENTION

[0001] The following invention, as stated in the title of this descriptive report, refers to a device of an elastic element for braking systems, which has been conceived and developed in order to obtain numerous and noteworthy advantages over other existing systems for similar purposes.

[0002] The invention is applicable to progressive brakes for transport systems using guide rails such as linear travelling systems, mining machinery, and especially in elevating or vertical transport systems.

[0003] The device is prepared to achieve a two-way braking system by means of a single elastic element, without the necessity of intermediate elements between it and the wedging element.

[0004] The device is based on a component, that gives the system the necessary rigidity in this type of devices, and at the same time serves as a guide to the wedging element.

BACKGROUND HISTORY OF THE INVENTION

[0005] Numerous devices are known which serve as elastic elements for guided system brakes, in particular, the ones used in brakes for elevation systems (lifts), designated according to European directives as progressive safety gear. The purpose of these devices is to stop the car and/or counterweight of a lift installation, in case that a certain speed is surpassed, maintaining acceleration in the brake process within certain margins.

[0006] The traditional lift brake systems basically consist of: a base or structure (2), that is fixed to the element to stop (car) and onto which the rest of the elements that make the brake are located; a brake shoe (3) that causes the braking force by friction with the guide rail (1) of the installation; a wedging element (5) which can be a roller or brake shoe that self-wedges against the guide rail after coming into contact with it as a consequence that the whole system moves together with the car, and the guide rail remains fixed; an elastic element (4) or spring intended to cause a normal force between the guide rail and the shoe brake as well as a certain deflection of the elastic element itself.

[0007] To guarantee that the braking force is kept within certain margins, once the nominal braking position is reached, the travel of the wedging element is limited by means of a stop (6) that is part of the structure of the brake, thereby guaranteeing, that the deflection and pressure of the elastic element are within the correct default or nominal values.

[0008] In this regard, we can cite devices in which the elastic element is based on superimposed flat plates or on single pieces with a determined shape. In both cases the elastic element is placed in a hole or cavity in the structure of the brake. The pressure that the elastic element withstands is transmitted to the structure of the brake, by means of two fixed supports in the structure of the brake, the elastic element behaving as a structure with two supports at both ends and supporting the pressure of the wedging element, which moves along the central part of the elastic element.

[0009] The drawback that these systems have is that they are only capable of braking in one direction.

[0010] Other types of elastic elements are obtained based on "beneville" type spring washers assembled in series, achieving the necessary rigidity. These washers act as traditional springs but they are much shorter, in the order of millimetres.

[0011] Regarding other systems capable of stopping in both directions, systems are known that use two elastic elements similar to the ones used in the one-way braking system but placed reversed, or one single elastic element with supplementary stress transmitting parts (7) between the wedging element and the elastic element. Another type of devices use a cam as a wedging element, permitting its utilisation in both directions with a single elastic element, albeit requiring a configuration different to the one considered, for the elastic element is placed on the side of the guide rail opposite the wedging element. There are also known systems that use two wedging systems together, in such way that each one of them acts in one direction. This type of system also needs intermediate parts between the wedging system and the elastic element.

[0012] The regulation of the braking capacity implies a change of the rigidity of the elastic element and is carried out in traditional systems in different ways, among them: changing the length between the supports by means of auxiliary parts (8) of interchangeable position, varying the thickness of the elastic element, substitution of the elastic element for another with similar shape, and varying any of it's dimensions as derived from a parametric formula. The biggest drawback of all of these systems is the need for interchangeable intermediate parts that serve as a union of the elastic element and the brake structure, or the use of different structures for each braking capacity.

[0013] The stop that limits the travel of the wedging element is a part of the base or brake structure in know systems.

DESCRIPTION OF THE INVETION

[0014] The invention device presents a new design, based on which it allows the brake to be applied in both directions with one single elastic element and without the need for intermediate parts between it and the wedging element, be it a roller, a shoe brake, or other. All of this is accomplished with the utmost simplicity with an easy to build system. For this, the elastic element is based on a long part with two opposite inclined ramps that are used to guide the wedging element in both

directions of operation. This elastic element can be made up of a single part or, to simplify production, by superimposing different parts of lesser thickness.

[0015] The elastic element is characterised for having a joint in the centre that allows it to pivot and serves as a fixing for the elastic element onto the brake structure, and for the different behaviour of its ends depending on the direction of operation: in a given direction, one of them behaves as a support while upon the other the wedging element exerts the corresponding pressure. When the wedging is produced in the opposite direction, the end that before acted as a support, in this case, would receive the pressure from the wedging element, while the end that was receiving the pressure before, in this case would behave as a support.

[0016] The joint can be accomplished in different ways, either by an axle, or any other type of support that permits the elastic element to pivot.

[0017] The fixing onto the brake structure can be equally accomplished in different ways, either directly upon the brake structure or base, or by means of intermediate parts that act as bolts or a stop. The support can be made on both sides of the support line of the wedging system upon the elastic element.

[0018] The braking force is produced as a consequence of the friction between the guide rail of the system and the brake shoes being part of the braking structure.

[0019] This system permits the possibility of having a larger braking force by being able to use a second friction zone different to the one obtained from the wedging element and its corresponding brake shoe. This is accomplished as a consequence of the pivot of the elastic element around its joint and the nearing of the end of the elastic element that acts as a support to the guide rail, the end behaving as a support and braking zone simultaneously. The support of the elastic element can rest on the guide rail directly, or through intermediate parts that transmit its effort to the guide rail. The other side of the guide rail rubs against a brake shoe. This fact allows having up to two friction zones more than conventional systems used up to now.

[0020] Regarding the regulation in the braking capacity, although other well known systems are applicable, the elastic element described in the present report enables it without the need for additional parts and without varying the general structure of the brake support, as it can be carried out by making slots or orifices of different dimensions upon one single elastic element with fixed exterior dimensions.

[0021] A stop for the travel limits of the wedging system may be implemented the same way as in any of the other known systems, however an innovative system can be applied in which the elastic element itself can act as a stop to limit the travel of the wedging element. This is accomplished by giving the ends of the elastic element a shape that can house the wedging element, this is especially applicable in case that the wedging system uses a roller.

[0022] Although the device of the present invention is designed for allowing two-way actuation, of course, it may also be used by systems in which operation in only one direction is necessary. For these systems, and in order to reduce dimensions and to have a more compact disposition, it is possible to obtain a configuration that has these features applying the essence of the invention. The disposition of the elastic element for these systems relies on giving the elastic element a "V" shape, being one of its sides the ramp on which the wedging element travels, as the second ramp is not necessary. The joint is placed in its central part as well, and one end acts as support while the other end works as a stop for the system and is acted upon by the wedging element.

[0023] To complete the description that follows and in order to have a better understanding of the invention's features, attached to this descriptive report are sketches with drawings that will help understand more easily the innovations and advantages of the object device of the invention.

BRIEF DESCRIPTION OF THE DRAWINGS

[0024]

Figure 1.- Shows a general diagram of a simple actuation safety gear in the normal position.

Figure 2.- Shows a general diagram of a simple actuation safety gear in stopped position.

Figure 3.- Shows a general diagram of a two-way actuation safety gear with intermediate parts.

Figure 4.- Shows a system for regulating the braking capacity by placing auxiliary parts in the supports, between the elastic element and the brake structure.

Figure 5.- Shows a first preferred disposition of the elastic element object of the invention.

Figure 6.- Shows a second preferred disposition of the elastic element object of the invention.

Figure 7.- Shows a third preferred disposition of the elastic element object of the invention.

Figure 8.- Shows a fourth preferred disposition of the elastic element object of the invention.

Figure 9.- Shows the first preferred disposition of the elastic element device in a brake for two-way guided systems in normal operation and wedging position.

Figure 10.- Shows the second preferred disposition of the elastic element device in a brake for two-way guided systems in normal operation and wedging position.

Figure 11.- Shows the third preferred disposition of the elastic element device in a brake for two-way guided systems in normal operation and wedging position.

Figure 12.- Shows the fourth preferred disposition of the elastic element device in a brake for two-way guided systems in normal operation and wedging position.

Figure 13.- Shows a preferred disposition of the regulating system for the braking capacity of the elastic element device.

Figure 14.- Shows a preferred disposition of the regulating system for the braking capacity of the elastic element device.

DESCRIPTION OF THE PREFERRED IMPLEMENTATIONS

[0025] As can be seen in the drawings, the elastic element device can be carried out in many ways, all of which respect the essence of the invention. Following are descriptions of four preferred implementations, three of them for two-way actuation systems and one for one-way actuation systems.

[0026] The common aspects for the three implementations are the following:

a) The object of the invention is made up of one single part with two inclinations in one of its sides that serve as a guide to the wedging element for both directions, (in one-way systems, only one inclination serves as a guide for the wedging element.)

b) The part is symmetrical with respect to the centre for simplicity, but this isn't necessary for correct operation.

c) In the middle there is a joint that allows it to turn freely by means of an orifice for its fixing through an axle (10) to the brake structure.

d) Both ends have support zones, that can be devised in different ways, this is the main difference between the four preferred implementations that follow:

The first preferred implementation of the elastic element (9) uses a projection (11) of the brake structure as support. This support is used as a stop for the wedging element.

The second preferred implementation of the elastic element (12) uses as support of the elastic element bolts that are joined to the brake structure and are located on the side of the elastic element opposite the wedging element. This way the stop (14) of the wedging system is the elastic element itself.

The third preferred implementation of the elastic element (15) is conceived to use two additional braking zones (16) as described in the report. In this case the support zones (16) are against the guide rail, and the elastic element is used as a stop (17) of the wedging system. To facilitate the production of the system and increase the anti-wear behaviour of the elastic element two brake shoes (18) are added to rub against the guide rail.

The fourth preferred implementation of the elastic element (19) is destined to one-way actuation brakes and is characterised by the support on one end being accomplished with a bolt (20) in a similar way as the second preferred implementation, and by the other end onto which the wedging element exerts pressure being free because it is not needed as a support, as the device only acts in one direction. The stop (21) of the wedging system is the elastic element itself. To make the system shorter the elastic element is given the shape of a "V".

[0027] The preferred regulation system is based on the making of orifices, slits or slots (22) of different diameters and widths to make a precise adjustment by slightly varying it's rigidity, and varying the total width (23) to accomplish a great variation of rigidity in the elastic element.

[0028] Independent from the object of the invention will be the materials used in the manufacture of the elastic element components, their shapes and dimensions, and all the accessory details that may come up, as long as they don't affect its essence.

REFERENCES USED IN THE DRAWINGS

[0029]

1.- Guide rail.
2.- Brake structure or base.
3.- Brake shoe.
4.- Elastic element.
5.- Stop element.
6.- Stop of the stop element.
7.- Supplementary stress transmitting parts.
8.-Auxiliary parts for regulation.
9.- First preferred implementation of the elastic element.
10.- Pivot axle.
11.- Support in the first preferred implementation of the elastic element.
12.- Second preferred implementation of the elastic

element.

13.- Support bolts in the second preferred implementation of the elastic element.

14.- Stop of the stop system in the second preferred implementation of the elastic element.

15.- Third preferred implementation of the elastic element.

16.- Additional braking and support zones in the third preferred implementation of the elastic element.

17.- Stop of the stop system in the third preferred implementation of the elastic element.

18.- Supplementary shoe brakes in the third preferred implementation of the elastic element.

19.- Fourth preferred implementation of the elastic element.

20.- Support bolt in the fourth preferred implementation of the elastic element.

21.- Stop of the stop system in the fourth preferred implementation of the elastic element.

22.- Fine regulation system by making orifices, slits or slots.

23.- Coarse regulation system by variation of the geometry.

Claims

1. Elastic element for guided system brakes of the type that consist of a part that allows two-way actuation without needing intermediate parts between it and the wedging system, essentially characterised for having a joint in its centre allowing it to pivot, and for having a different behaviour on its ends depending the actuation direction of the safety gear.

2. Elastic element for guided system brakes according to claim 1 characterised for the possibility of having two braking zones, one caused by the wedging system and its corresponding brake shoe, and the other caused by the reaction of the elastic element's support and its corresponding brake shoe.

3. Elastic element for guided system brakes according to claim 1 characterised by the possibility of regulating its braking capacity by means of making orifices or slits.

4. Elastic element for guided system brakes according to demand 1 characterised by the possibility of including by virtue of its own shape a stop for the wedging element.

5. Elastic element for guided system brakes of the type that consist of a part that allows actuation in only one direction without needing intermediate parts between it and the wedging system, essentially characterised for having a joint in its centre allowing it to pivot, for having a different behaviour on both its ends and being the stop of the wedging system the elastic element itself.

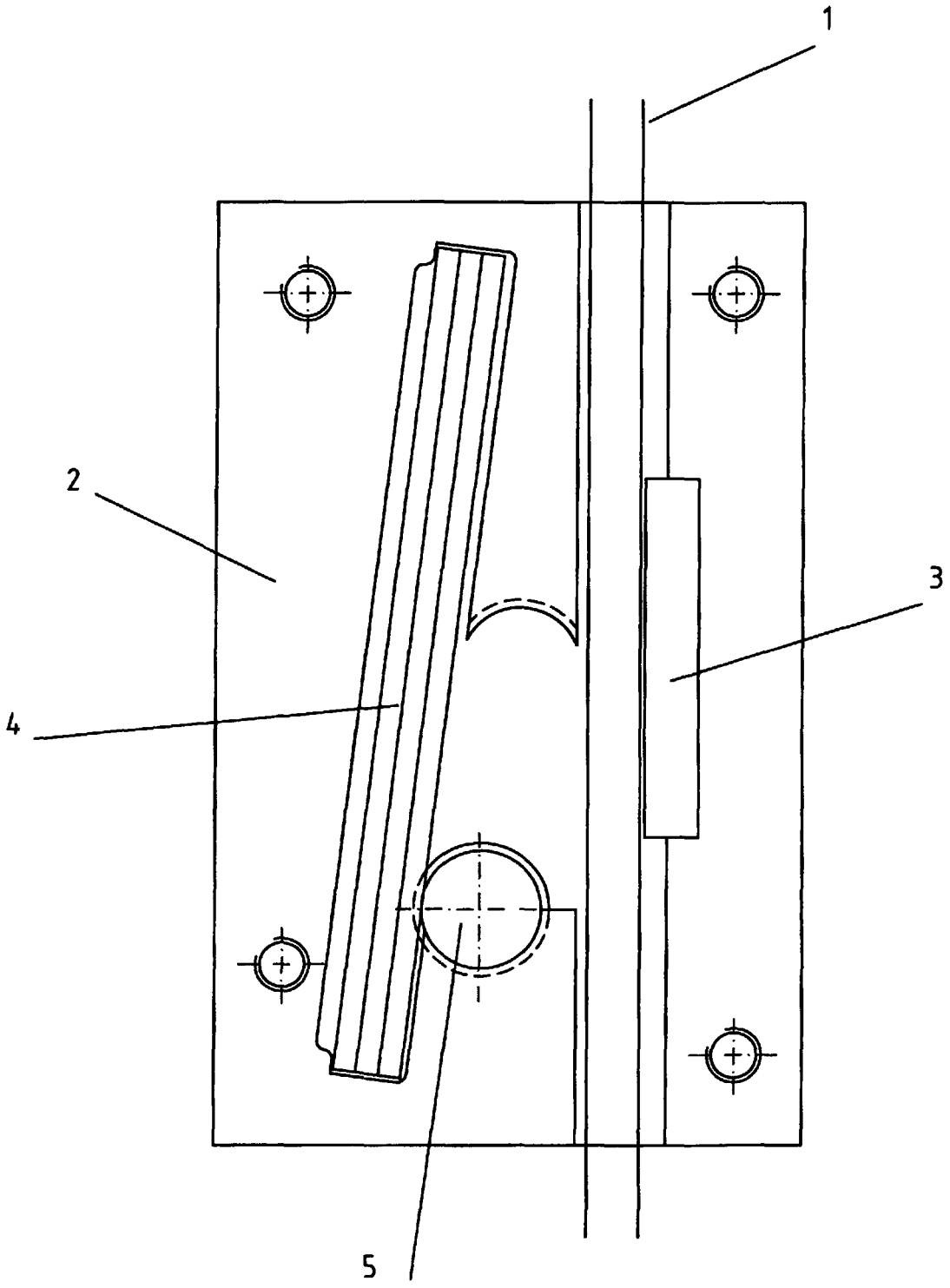


Figure 1

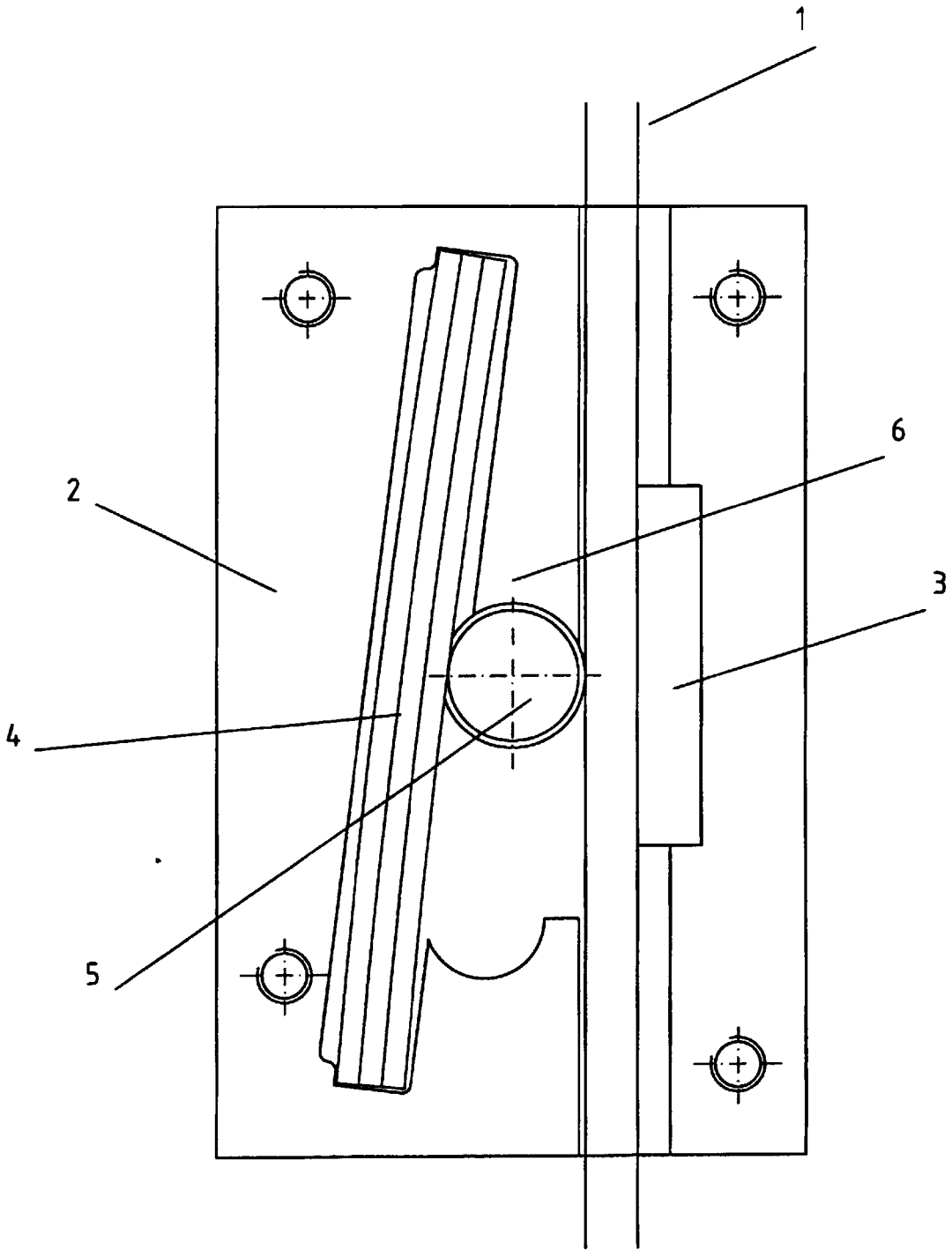


Figure 2

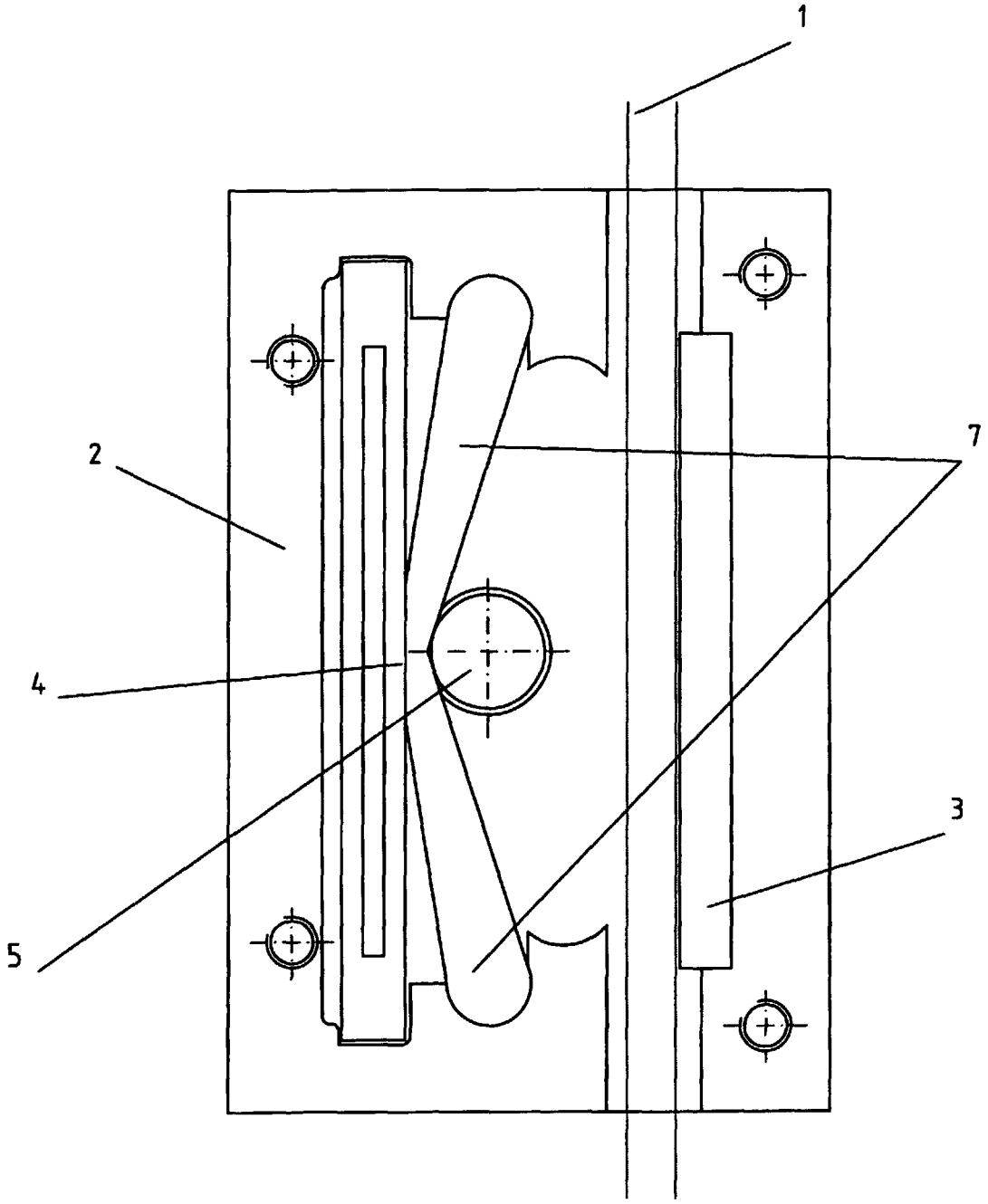


Figure 3

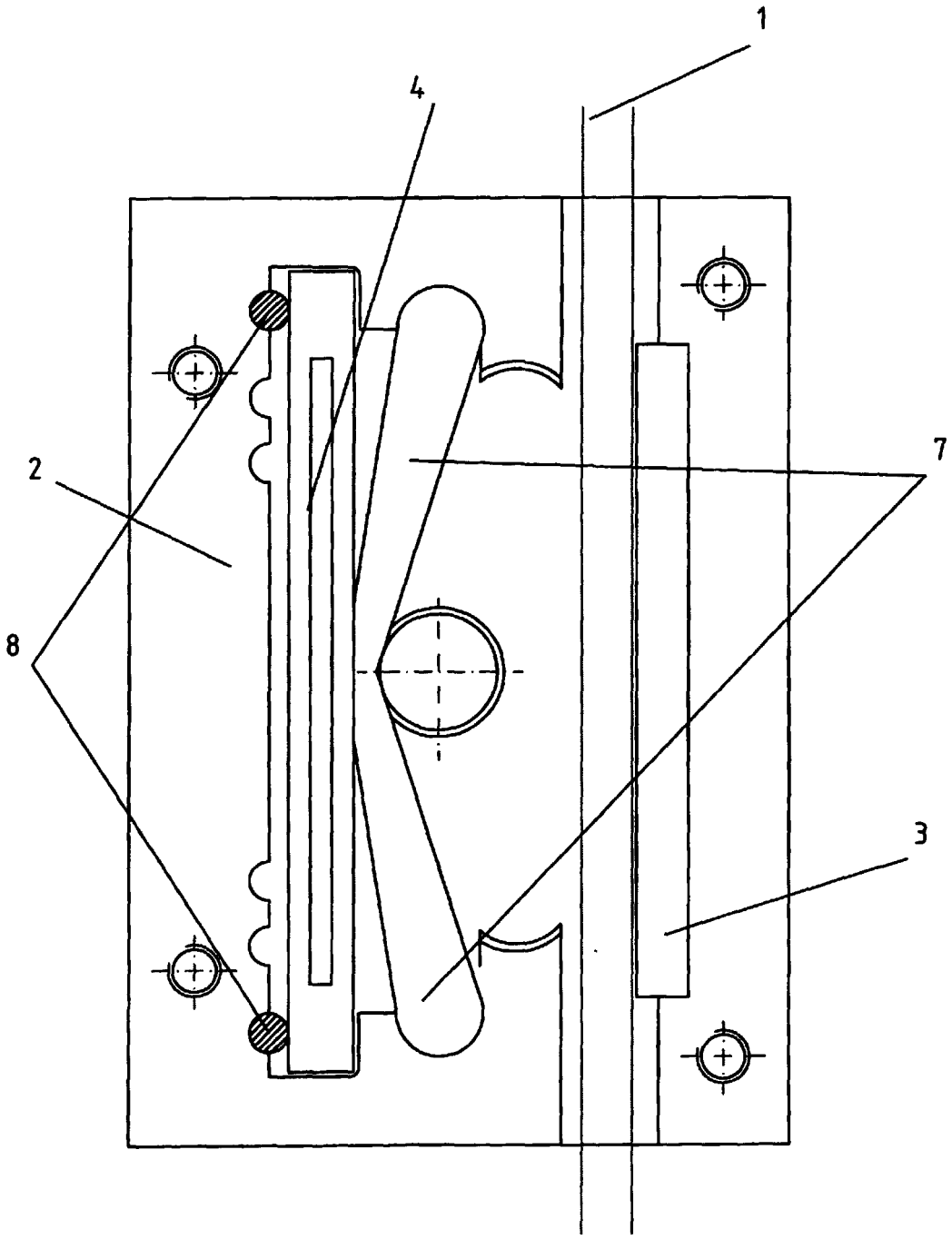


Figure 4

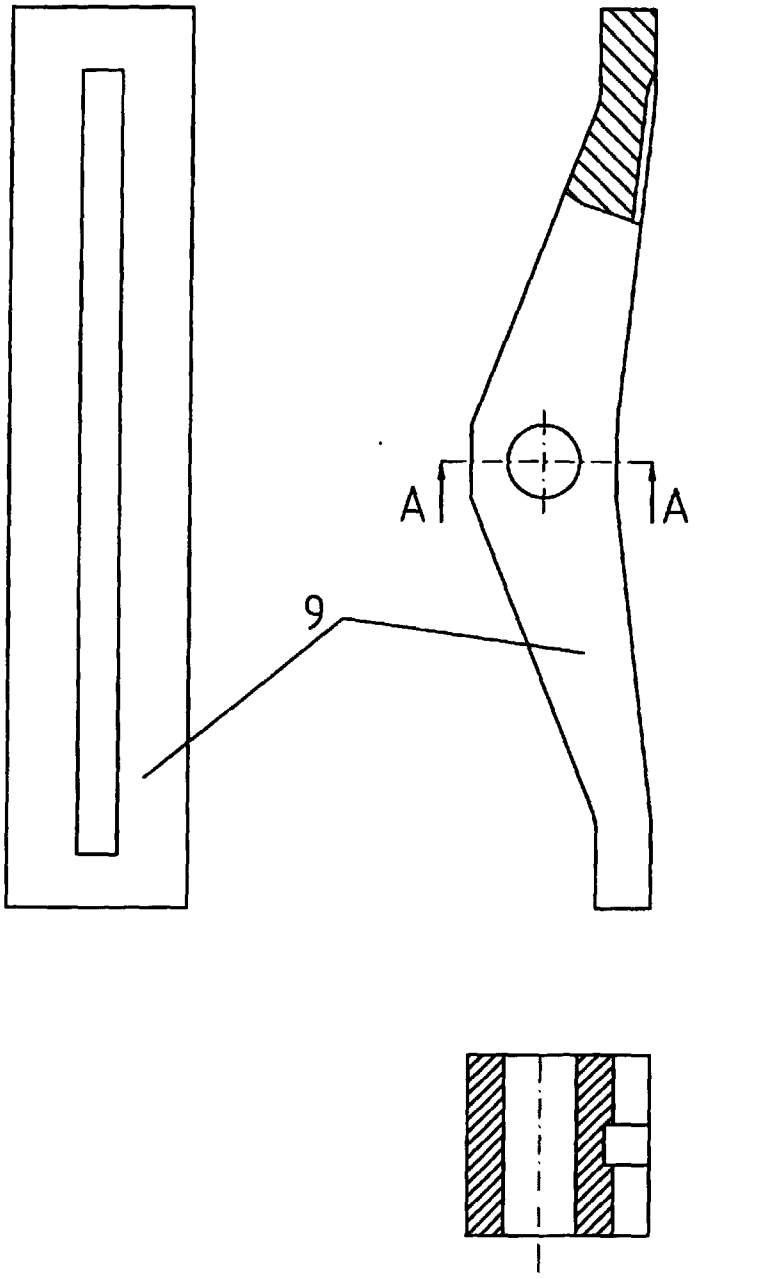


Figure 5

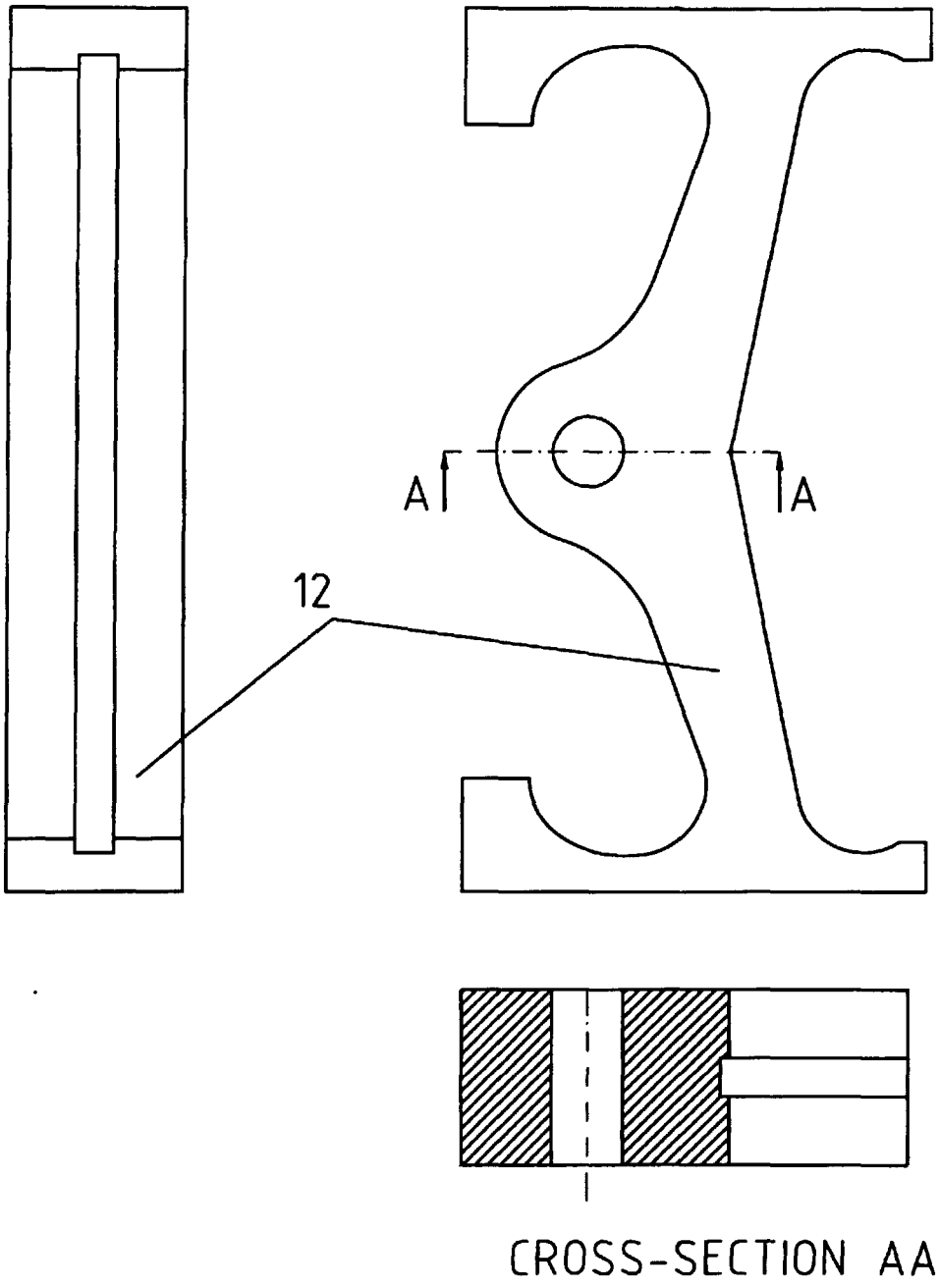


Figure 6

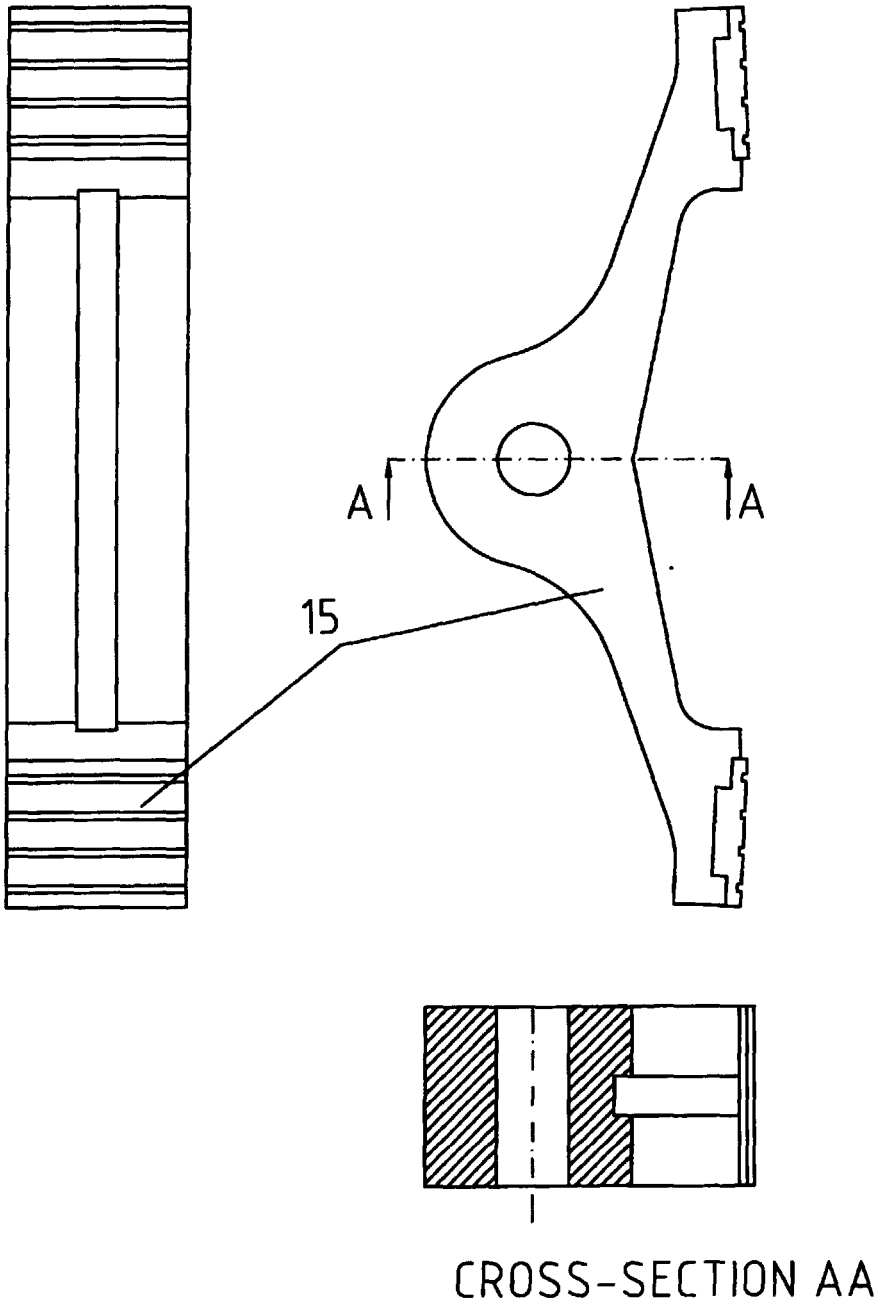
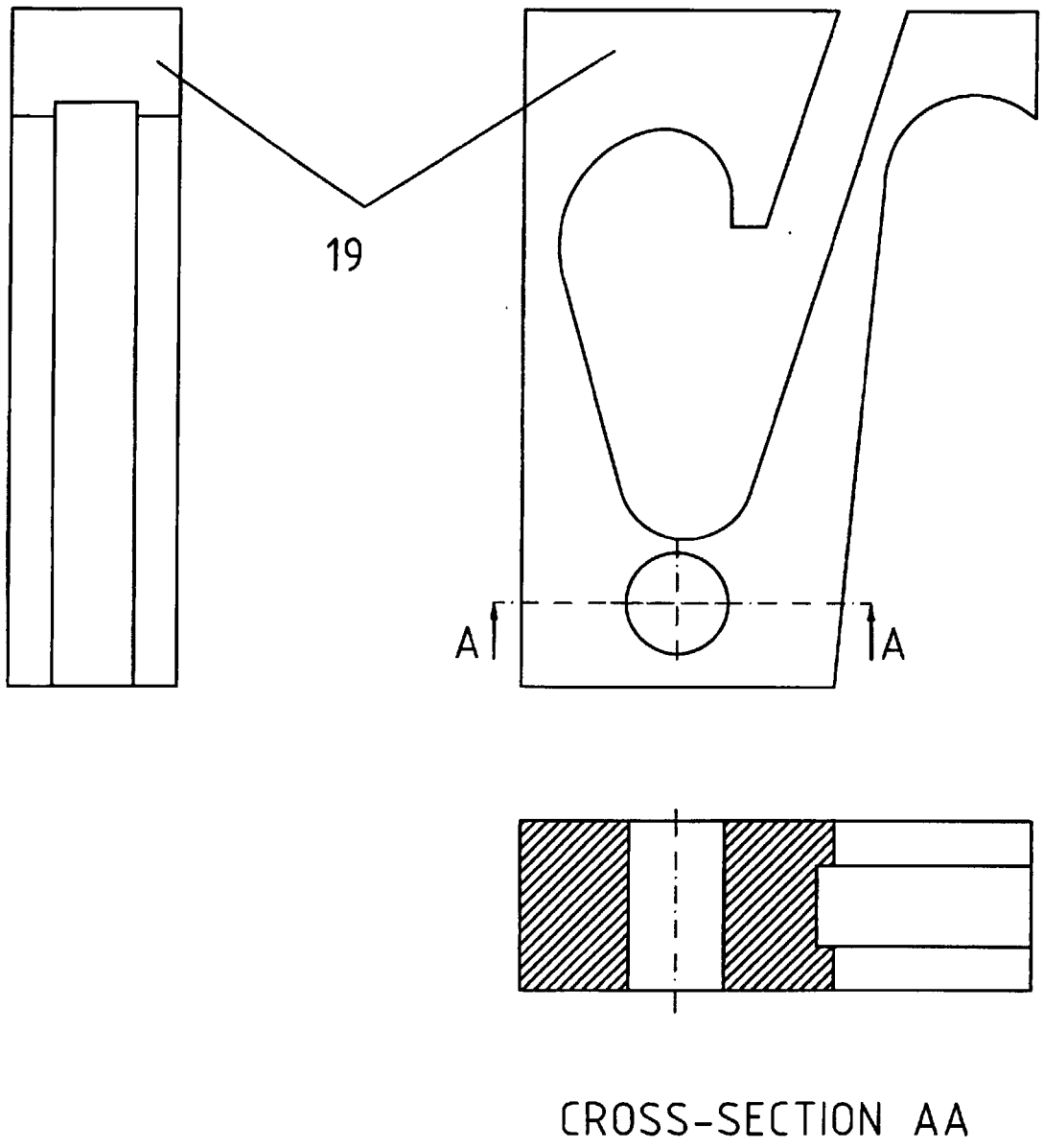


Figure 7



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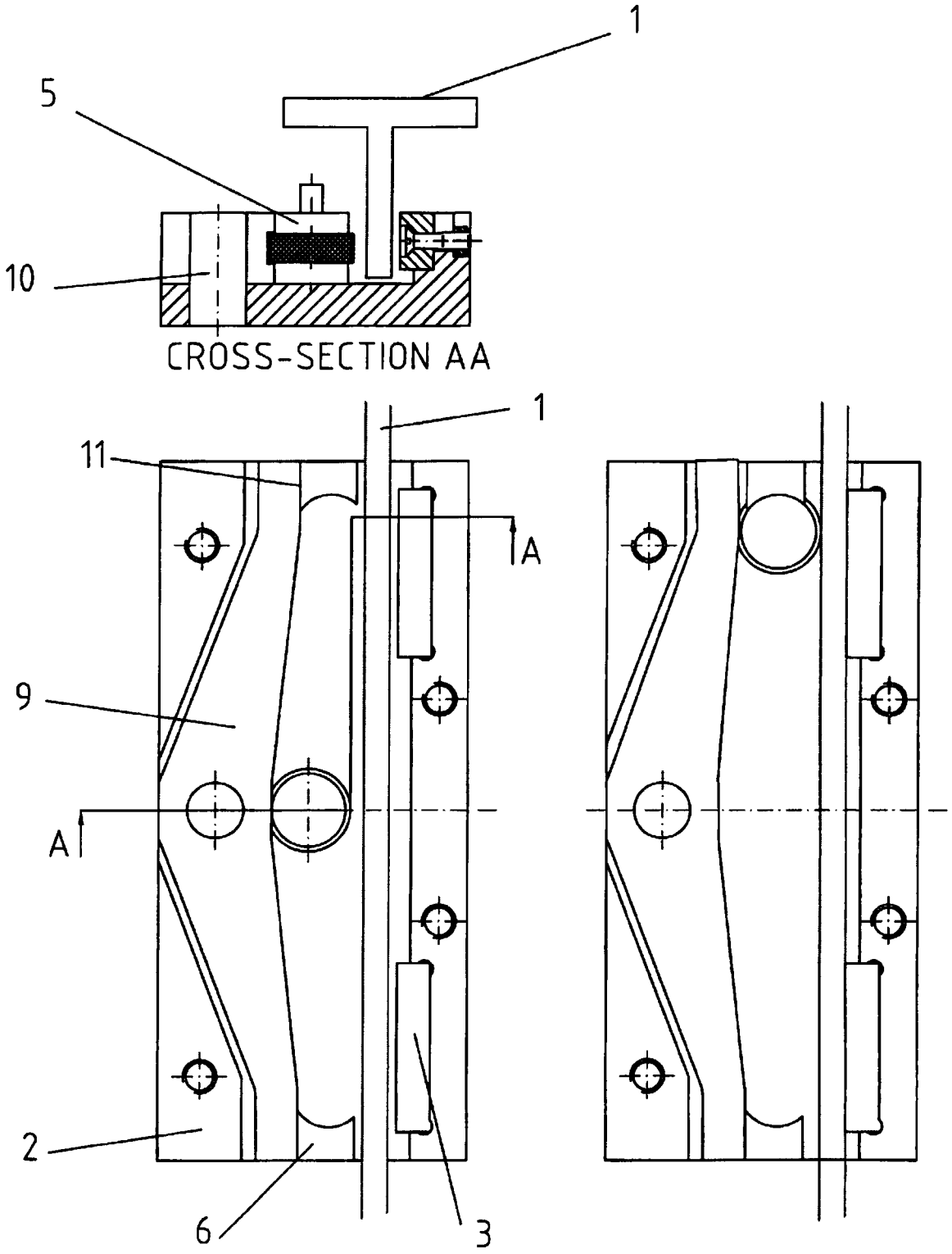


Figure 9

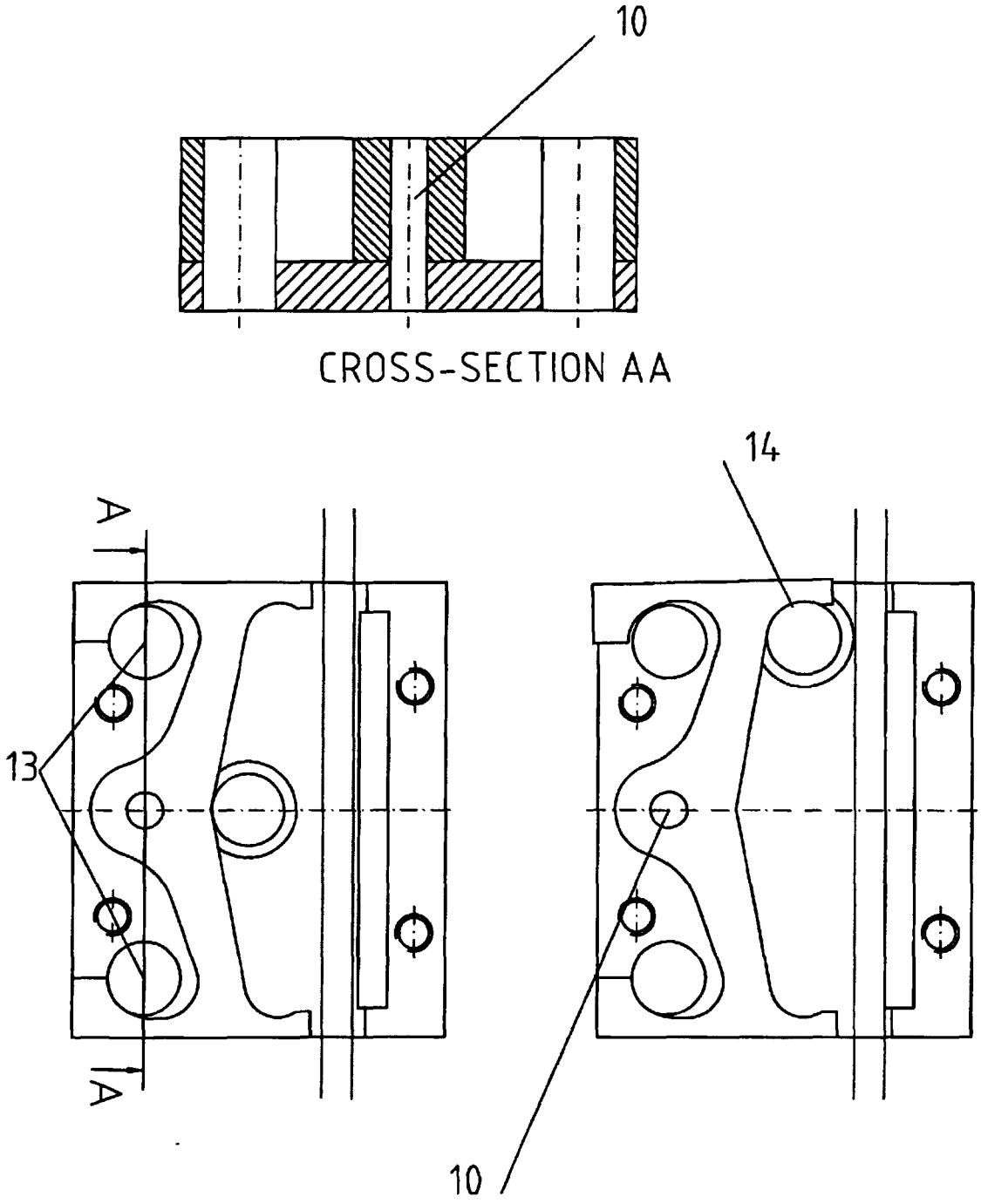
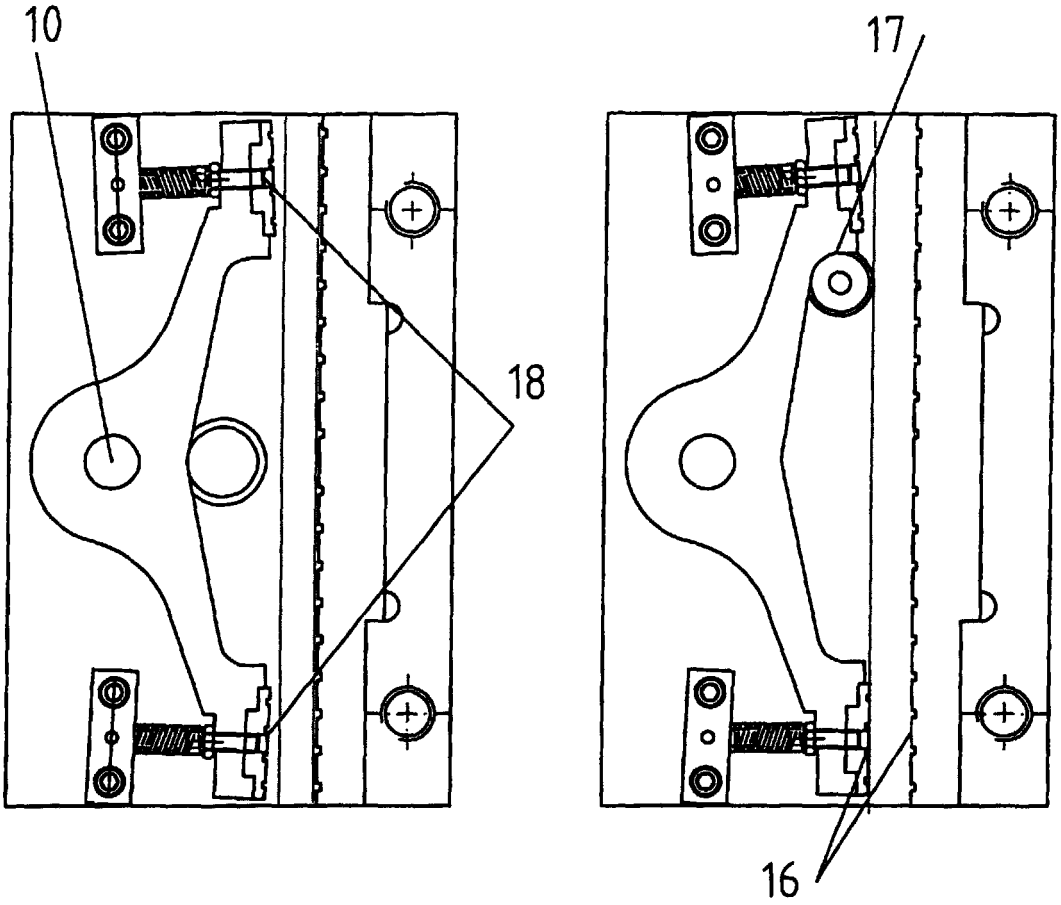


Figure 10



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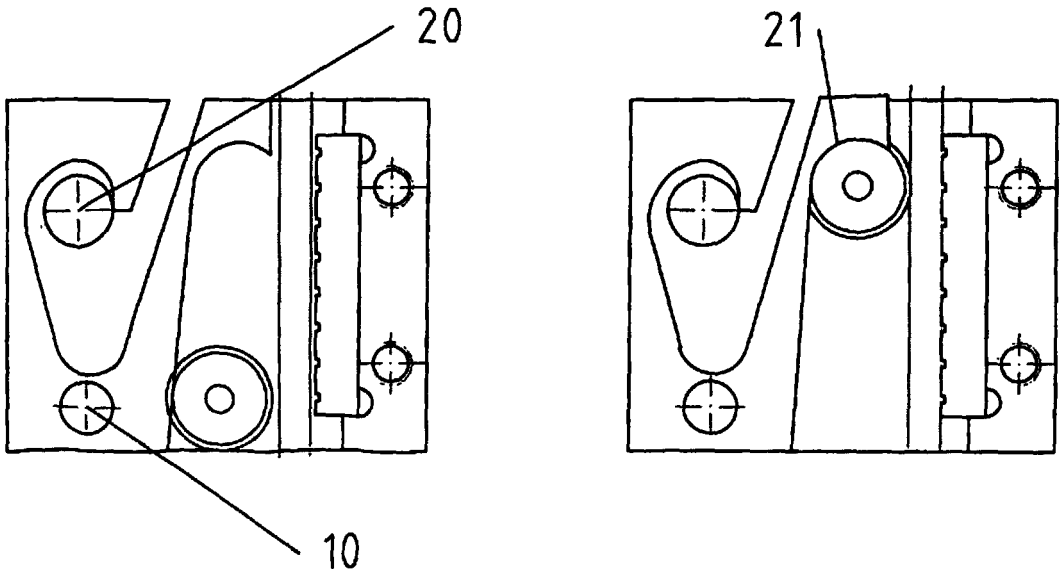

Figure 12

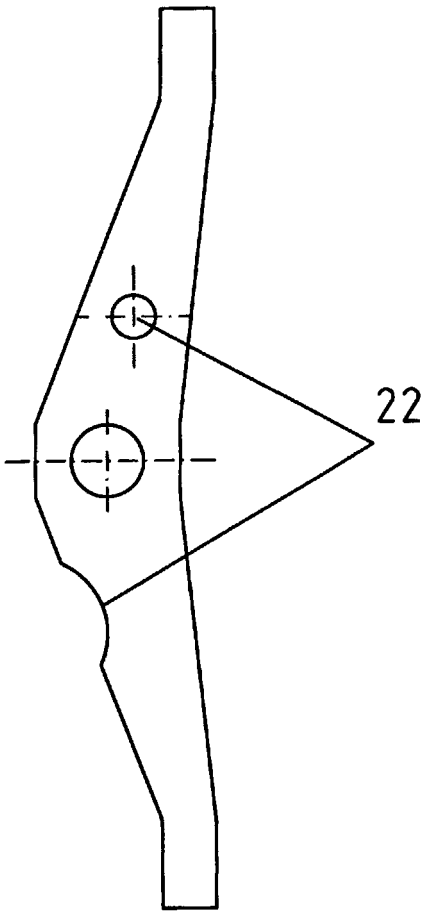

Figure 13

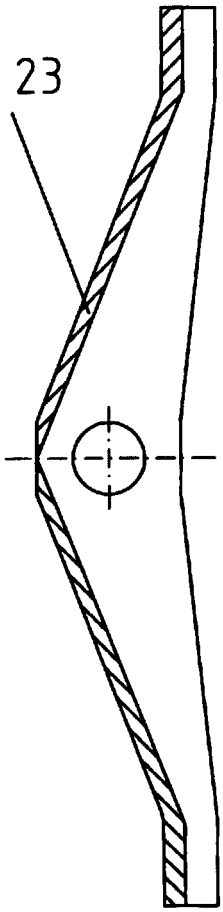

Figure 14

INTERNATIONAL SEARCH REPORT

International application No.
PCT/ES 99/00386

A. CLASSIFICATION OF SUBJECT MATTER
IPC 7 : B66B 5/22
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 7 : B66B

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

CAJETINES O.E.P.M.

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

CIBEPAT, EPODOC, PAJ, WPI

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	WO 9731852 A (COBIANCHI LIFTTEILE) 04 September 1997 (04.09.97) page 7, line 25 – page 9, line 30 ; figures 15-22	1-4
P, A	ES 1040377 U (LATAPIA LLINAS) 01 April 1999 (01.04.99) the whole document	1-4
A	DE 513405 A (ATG Allgemeine Transportanlagen GmbH) 27 November 1930 (27.11.30) the whole document	1
A	US 5224570 A (FROMBERG) 06 July 1993 (06.07.93), the whole document	5
A	US 4538706 A (KOPPENSTEINER) 03 September 1985 (03.09.85) the whole document	5

☐ Further documents are listed in the continuation of box C. ☒ Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
27 March 2000 (27.03.00)	31 March 2000 (31.03.00)
Name and mailing address of the ISA/ SPTO	Authorized officer Telephone No.

Form PCT/ISA/210 (second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT
Information on patent family members

International Application No
PCT/ ES 99/ 00386

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