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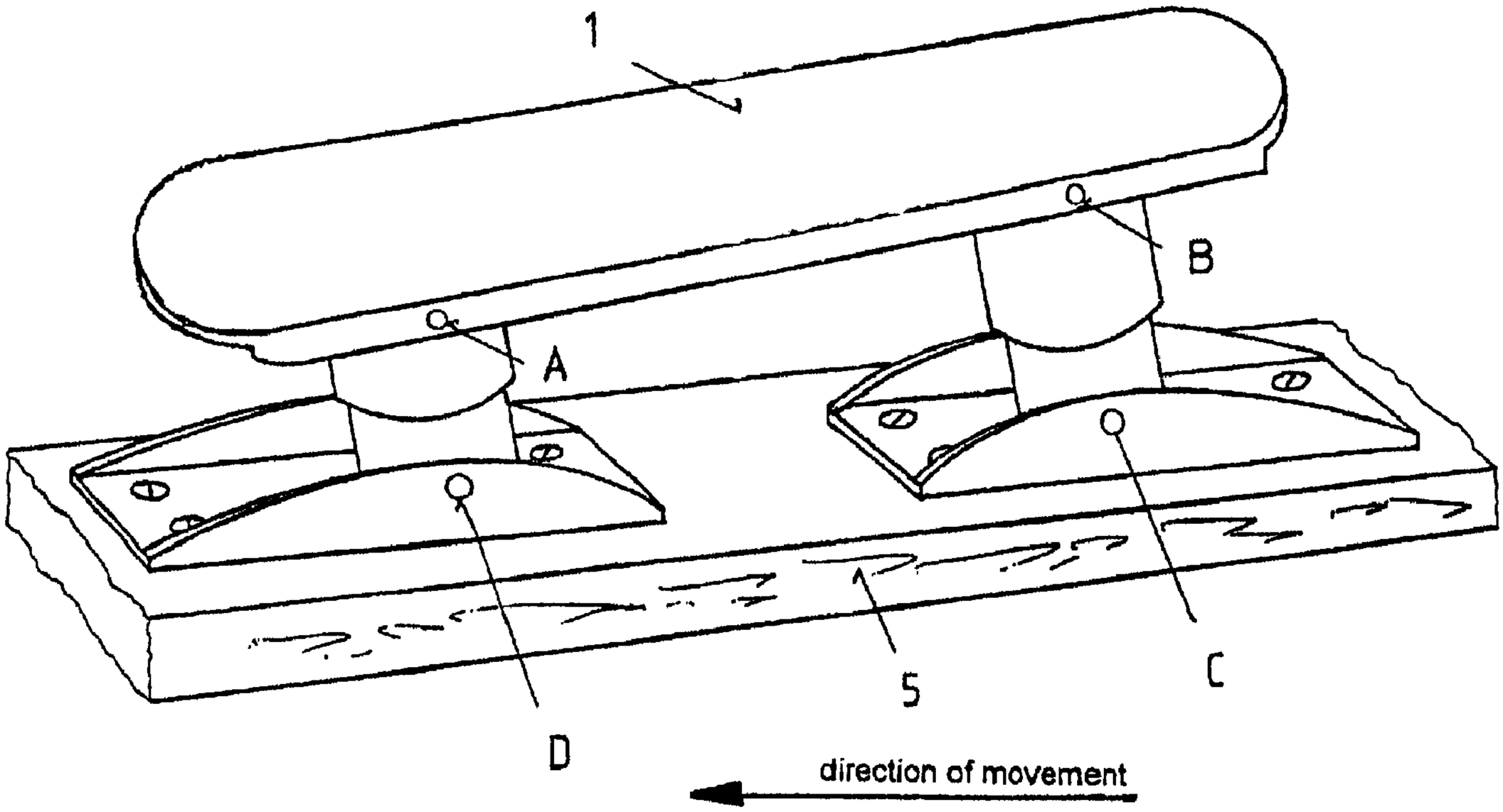
(54) Titre : PLAQUE DE RENFORCEMENT DE LA PRESSION SUR LA PARTIE DE GUIDAGE DU SKI
(54) Title: SKI GUIDE PRESSURE INTENSIFIER PLATE (SNOW-SPEED)




(57) Abrégé/Abstract:
By way of a ski binding assembly plate which can be fixed or can be adjusted in terms of its forward inclination and height the pressure on the front guide part of the ski is increased. By way of the fact that the ski binding assembly plate is fastened on the ski by way of a two-point support and arrest system, the ski obtains a free bending moment, by which means the ski is dynamic and runs very smoothly. A wedge function and a force transmission system prevent the ski from being propelled back by the counter pressure in the region of the ski binding. By way of a damping system vibrations and knocks are absorbed. The plate may be equipped with any brand of ski binding. It fits each type or brand of ski. The individual adjusting possibility of this plate permits the adaptation, which suits each ski, each skiing style and each technical level of the skier.

## Abstract

By way of a ski binding assembly plate which can be fixed or can be adjusted in terms of its forward inclination and height the pressure on the front guide part of the ski is increased. By way of the fact that the ski binding assembly plate is fastened on the ski by way of a two-point support and arrest system, the ski obtains a free bending moment, by which means the ski is dynamic and runs very smoothly. A wedge function and a force transmission system prevent the ski from being propelled back by the counter pressure in the region of the ski binding. By way of a damping system vibrations and knocks are absorbed. The plate may be equipped with any brand of ski binding. It fits each type or brand of ski. The individual adjusting possibility of this plate permits the adaptation, which suits each ski, each skiing style and each technical level of the skier.

# SKI GUIDE PRESSURE INTENSIFIER PLATE (SNOW-SPEED)

## BACKGROUND OF THE INVENTION

This invention relates to a ski binding assembly plate which can be fixed or can be adjusted in forward inclination and height, for increasing the pressure on the front guide part of the ski. This gives the ski a certain aggressiveness. Because the ski binding assembly plate is fastened on the ski with a two-point support and arrest system, the ski obtains a free bending moment, and thus the ski is dynamic and runs very smoothly. A wedge function and a force transmission system prevent the ski from being propelled back by the counter pressure in the region of the ski binding. These systems also dampen vibrations of the ski. Thus the ski has a biting grip on hard snow. A damping system absorbs vibrations and knocks. The plate may be equipped with any brand of ski binding and the plate fits each type or brand of ski. The individual adjusting of this plate permits the adaptation, which suits each ski, each skiing style and each technical level of the skier.

## SUMMARY OF THE INVENTION

The ski binding assembly plate is manufactured in various embodiments. Various light metal or plastic profiles or profiles of other materials (rectangular tube, U-profile, C-profile) are used which may be adhered above and below as a reinforcement to a steel plate, plastic plate or other materials. Another possibility lies in that one uses cast molds which permits a construction type in which the aesthetics and the design may be enhanced.

In one aspect, the invention provides an interface device between a shoe and a ski sport apparatus, having a ski guide pressure intensifier plate for receiving the shoe, the ski guide pressure intensifier plate defining a plate plane and a longitudinal direction running in the plate plane, a first and a second fastening element which in the longitudinal direction are distanced from one another and each form a connection to the ski sport apparatus, a first connection between the first fastening element and the ski guide pressure intensifier plate, wherein the first connection contains a first joint, a

second connection between the second fastening element and the ski guide pressure intensifier plate, wherein the second connection contains a second joint, and compensation means for compensating a distance change between the first and the second fastening element, the interface device comprising:

action means for forming external forces acting on the ski support apparatus that depend on a given bending of the ski sport apparatus and for maintaining largely intact a bending line of the ski sport apparatus below the ski guide pressure intensifier plate, independent of forces acting on the ski guide pressure intensifier plate and the ski sport apparatus.

In one aspect, the invention provides an interface device between a shoe and a ski sport apparatus, having a ski guide pressure intensifier plate for receiving the shoe, the ski guide pressure intensifier plate defining a plate plane and a longitudinal direction running in the plate plane, a first and a second fastening element which in the longitudinal direction are distanced from one another and each form a connection to the ski sport apparatus, a first connection between the first fastening element and the ski guide pressure intensifier plate, wherein the first connection contains a first joint, a second connection between the second fastening element and the ski guide pressure intensifier plate, wherein the second connection contains a second joint, and compensation means for compensating a distance change between the first and the second fastening element, the improvement comprising:

action means, which given a bending of the ski sport apparatus form external forces acting on the ski sport apparatus, for maintaining largely intact a bending line of the ski sport apparatus below the ski guide pressure intensifier plate, independent of forces acting on the ski guide pressure intensifier plate, the action means transmitting a turning moment from a ski sport apparatus region outside the ski guide pressure intensifier plate into the ski sport apparatus below the ski guide pressure intensifier plate, and the action means comprise at least one tab suitable for fastening in the longitudinal direction one of on and in the ski sport apparatus.

In one aspect, the invention provides an interface device between a shoe and a ski sport apparatus, having a ski guide pressure intensifier plate for receiving the shoe, the ski guide pressure intensifier plate defining a plate plane and a longitudinal direction running in the plate plane, a first and a second fastening element which in the longitudinal direction are distanced from one another and each form a connection to the ski sport apparatus, a first connection between the first fastening element and the ski

guide pressure intensifier plate, wherein the first connection contains a first joint, a second connection between the second fastening element and the ski guide pressure intensifier plate, wherein the second connection contains a second joint, and compensation means for compensating a distance change between the first and the second fastening element, the improvement comprising:

action means, which given a bending of the ski sport apparatus form external forces acting on the ski sport apparatus, for maintaining largely intact a bending line of the ski sport apparatus below the ski guide pressure intensifier plate, independent of forces acting on the ski guide pressure intensifier plate, wherein the action means are integrated in the ski sport apparatus, the action means comprise at least one tab mounted in the ski sport apparatus in the longitudinal direction, and the ski sport apparatus is one of a ski and a snow board.

## BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is a perspective view of a ski guide pressure intensifier plate (Snow Speed);

FIG. 2 shows a partial side sectional view and a top sectional view of a ski guide pressure intensifier plate;

FIG. 3 shows a diagrammatic view of a bending moment diagram for a 2-point support and arrest system;

FIG. 4 is a diagrammatic view showing different parameters for height adjustment;

FIG. 5 is a diagrammatic view showing different parameters for inclination angle adjustment;

FIG. 6 is a diagrammatic view showing damping effects;

FIG. 7 shows a side view, a front partial sectional view and a top view of a pressure intensifier plate according to one embodiment of this invention;

FIG. 8 shows a side partial sectional view, a front sectional view and a top sectional view of a pressure intensifier plate according to one embodiment of this invention;

FIG. 9 shows a side partial sectional view, a first front sectional view, a top sectional view and a second front sectional view of a pressure intensifier plate, according to one embodiment of this invention;

FIG. **10** shows a side partial sectional view, a front partial sectional view and a top sectional view of a pressure intensifier plate, according to one embodiment of this invention;

FIG. **11** shows a side partial sectional view and a front sectional view of a height adjustment apparatus according to one embodiment of this invention;

FIG. **12** shows a side partial sectional view of a height adjustment with threads for a front fastening, a side partial sectional of a height adjustment with thread for a rear fastening, a front sectional view and a top sectional view of a fastener;

FIG. **13** shows a partial sectional view of a height adjustment with thread for a front fastening and a partial sectional view of a height adjustment with thread for a rear fastening;

FIG. **14** shows a side sectional view of a height adjustment with thread;

FIG. **15** shows a side sectional view and a top sectional view of a height adjustment with thread;

FIG. **16** shows a side sectional view of a height adjustment with hinges;

FIG. **17** shows a side partial sectional view of a front spring system, a side sectional view of a rear spring system and a front sectional view, each of a damping effect by way of spring and air cylinder;

FIG. **18** shows a side partial sectional view of a front spring system, a side partial sectional view of a rear spring system, and a front view, each of a damping effect by way of leg springs and hinges or compression springs;

FIG. **19** shows a sectional view of a damping effect by way of compression springs and air cylinder;

FIG. **20** shows a sectional view of a damping effect by way of compression springs and air cylinder, in a lowermost position, and a top sectional view of the damping effect;

FIG. **21** shows a side sectional view, a front sectional view and a top view of a fastening on the ski with jacks;

FIG. **22** shows a side sectional view, a front sectional view and a top sectional view of a length compensation carriage;

FIG. **23** shows a side sectional view, a front sectional view and a top sectional view of a length compensation carriage;

FIG. 24 shows a side sectional view, a top sectional view, a front sectional view, and a second top sectional view of a fastening on the ski;

FIG. 25 shows a side sectional view, a front sectional view, a top sectional view and a partial side view of a wedge apparatus;

FIG. 26 shows a side sectional view, a front sectional view and a top view of a wedge apparatus;

FIG. 27 shows a side sectional view, a front sectional view and a top view of a wedge apparatus;

FIG. 28 shows a side sectional view, a front sectional view and a top sectional view of a travel multiplication and adjustment apparatus for wedge functions;

FIG. 29 shows a side sectional view and a top sectional view of a pantograph;

FIG. 30 shows a side sectional view of a travel multiplication apparatus;

FIG. 31 shows a side sectional view of a travel multiplication apparatus;

FIG. 32 shows a diagrammatic view, a side sectional view for a front area, a top view for a front area, a side sectional view for a rear area and a top view for a rear area of a forced transmission system;

FIG. 33 shows a schematic diagram of a forced transmission function;

FIG. 34 shows a schematic diagram of a wedge function;

FIG. 35 shows a schematic diagram of an effect of guide pressure point; and

FIG. 36 shows a schematic diagram of a force compensation according to a lever principle.

## DESCRIPTION OF PREFERRED EMBODIMENTS

Different embodiments and different details of elements of the ski binding assembly plate of this invention are described in the following specification.

**Standard design** (see Fig. 7, 8)

This embodiment may not be adjusted in height and in inclination. It is manufactured according to use. In the world cup at present there is prescribed a 5.5 cm height from the lower edge of the ski to the lower edge of the ski shoe. For the carving region a higher version is considered. It is equipped with a two-point support and arrest system and a force compensation system. Additionally it may be equipped with a damping system.

It is equipped with or without length compensation rollers.

: **Adjustable embodiment** (see Fig. 1, 2)

This embodiment may be adjusted in height, in inclination and in length. It contains always a two-point support and arrest system, and according to use may be supplemented with a force transition system or a wedge function or in combination with both systems with a damping system.

: **Embodiment integrated in the ski binding** (see Fig. 9, 10)

This embodiment is the same as the standard embodiment or the adjustable embodiment, however it is integrated directly into the ski binding. The ski binding assembly plate is at the same time the guide rail for the adjustment of the ski binding.

: **Embodiment in one piece**

This embodiment is the same as the standard embodiment or the adjustable embodiment, or the embodiment integrated in the ski binding. It is however manufactured of one piece. With this it is meant that when the fastening on the ski and on the ski binding assembly plate may be transmitted with plastic screws, also the whole device may be manufactured of plastic or of other materials from one piece. It is not meant that the ski binding assembly plate does not consist of several components such as for example height adjusting screws, length compensation carriage, etc., but that it with the arrest parts on the ski is a plastic cast part or a cast part of other materials.

: **Embodiment for snowboards**

This embodiment is the same as the standard embodiment or the adjustable embodiment, however is adapted to the width of the snowboard.

**1. Two-point support and arrest system** (see Fig. 3)

The two point support and arrest system gives the ski a free bending moment. This means that the ski has on its whole length, also in the region of the binding, the possibility of freely deflecting. "Two-point" indicates the support at the front and rear on the ski at which the ski binding assembly plate is fastened by way of a length compensation carriage and via a rigid fastening, and not the assembly points of the plate, whose number may be varied according to the construction type.

**1.1 Length compensation** (see Fig. 33, force transmission function)

By way of the force action F6 at the rear and the back on the ski according to the curve the ski obtains a bending moment. This requires a length compensation of up to 8 mm with respect to the ski binding assembly plate. This length compensation is ensured in two ways.

: **Construction type THP (tubes, hinges or pantograph)** (see Fig. 1)

This construction type is constructed with rods or hinges of light metal or plastic or other materials in that a fixed point (D) and three pivots (A,B,C) are applied. These pivots (A,B,C) permit a length compensation. The fixed point (D) serves for fixing the ski binding assembly plate. The fixed point may be defined at any point (A,B,C,D) according to use.

: **Construction type LCC (length compensation carriage)** (see Fig. 2)

The construction type is characterised by the application of a length compensation carriage which is applied in the ski binding assembly plate according to the construction type, at the front or the rear. The length compensation carriage reacts to force actions which only act on the ski at the front, as well as force actions which only act on the ski at the rear, as well as to force actions which act at the front as well as the rear. This length compensation is the basis for realising the wedge function. It is manufactured in light metal or in other materials.

**1.2 Rotational point according to the lever principle**

(See Fig. 36, force compensation according to the lever principle)

As soon as the ski is deflected at the ski binding assembly plate at the front and at the rear there arises a pivot according to the lever principle (see Fig. 33 force transmission function). So that this rotational point may be ensured according to the use two different construction types may be applied.

**. Length compensation carriage with steel screws** (see Fig. 22)

The steel screws for fastening the ski binding assembly pate on the ski are mounted with two aluminium of steel platelets or other materials which may move in the axial direction. These platelets are guided over aluminium or steel carriers or other materials, by way of two axles, on rollers.

**. Length compensation carriage with plastic screws** (see Fig. 23)

The plastic screws for fastening the ski binding assembly plate on the ski permit on account of their elasticity for the length compensation carriage to be adapted in inclination to the bending moment. For obtaining the strength larger screws are used.
(see Figure 2, arrangement of the functions)

**1.3 Action of the guide pressure points** (see Fig. 35)

The ski guiding, the vibrations and the smooth running at the front and rear are dependent on the position of the guide pressure points. The guide pressure point FD1 is important for the introduction of the momentum. It is placed on the ski further forwards. The guide pressure point FD2 is important for the guide phase or closure phase of the momentum. It is placed on the ski further to the rear. This effects a more consistent guiding of the ski, less vibration and a greater running smoothness.

**1.4 Adjusting the guide pressure point**

For adjusting the guide pressure point FD1 and FD2, or fastening the ski binding assembly plate on the ski, in the plate there are provided various bores or a slot so that via an adjusting screw any position may be set. These positions lie for the front guide pressure point FD1 in the region of 25 cm to 50 cm, measured from the assembly point in the middle of the ski shoe, up to the front guide pressure point FD1 and for the rear guide pressure point FD2 in the region of 25 cm to 40 cm, measured from the assembly shoe in the middle of the ski shoe, up to the rear guide pressure point FD2.

**1.5 Force compensation according to the lever principle** (see Fig. 36)

With the intrinsic weight and the centrifugal force F3 in the curve and the counter pressure F4 from the ground or the snow there arise forces according to the lever principle, on account of which the two forces F3 and F4 mutually compensate. This acts favourable on the vibrations and knocks. One may expect additionally an increased running smoothness of the ski.

**1.6 Force compensation by way of force compensation function or wedge function** (see Fig. 33, 34)

By way of the counter pressure F4 the free bending moment in the region of the binding is unfavourably influenced. This negative effect is prevented by a force transmission system or a wedge function or in combination with both systems.

## 2. Force transmission system

### 2.1 Force transmission function (see Fig. 33)

The free bending moment is ensured by way of the force transmission function in that the force action F6 according to the curve via a pivot according to the lever principle is converted into a resulting force F5 which lifts the counter pressure F4. The length of the force transmission tabs is on account of the force ratio defined according to the lever principle. With an adjusting screw the height is adjusted and a fine adaptation of the ski is carried out.

This system effects additionally to the free bending moment, less vibration and thus a better grip, particularly on hard snow.

### 2.2 Construction type of the force transmission system (see Fig. 32)

The force transmission tabs are manufactured in light metal or plastic or other materials and rigidly screwed on the front part or rear part of the ski. A plastic U-disk ensures a slight bending moment. By way of the bending moment of the ski between the tab and the ski there arises a length distance of up to 2 mm. This length compensation is milled in the tabs by way of longitudinal grooves in the direction of the middle of the ski. The fastening is effected with special flat head shank screws and a plastic U-disk in order to ensure a slight bending moment and a smaller friction for the length compensation. Instead of the plastic U-disk the friction may be lifted with a roller which runs in a groove transversely to the length compensation.

## 3. Travel multiplication (see Fig. 30, 31)

The travel multiplication multiplies the reaction force of the length compensation carriage from max. 8 mm to a travel of approx. 30 mm. According to the construction type of the wedge function this is converted into a co-running or counter-running direction. It may according to the requirement of the wedge function be assembled at various positions in the plate. The force transmission is effected via light metal tabs or tabs manufactured of other materials which are arranged according to the lever principle.

### 3.1 Travel multiplication with gearwheel gear

The force transmission is transmitted via a gearwheel gear with a rack of plastic or other materials.

**3.2 Travel multiplication with a tension or compression spring** (see Fig. 2)

In order to counteract the inertia of the whole system of the ski, on the force transmission lever a tension or compression spring may be placed.

**3.3 Travel multiplication with an implemented wedge** (see Fig. 29)

In the travel multiplication there is co-implemented a wedge function of light metal or other materials in order to prevent a propelling-back of the forces. This is necessary for the application of a pantograph of light metal or other materials.

**4. Wedge function** (see Fig. 34)

The wedge function lifts the unfavourable bending moment which arises by way of the counter pressure F4. The initial point is the length compensation carriage which reacts to the smallest force action F6 according to the curve (reaction path up to approx. 8 mm). This path of 1-8 mm is multiplied via the travel multiplication to max. 30 mm. The 30 mm correspond to the maximum required wedge movement. The wedge has an inclination of 15 degrees and thus a good precondition for the force transmission onto the adjusting screw. This is required for the height adjustment and for a fine adaptation of the ski.

Reversely the counter force F4 acts from the ground or the snow at an angle of 75 degrees onto the wedge and is thus not in the position of influencing the wedge. Thus the recoil force is eliminated. The free bending moment is ensured by the wedge which extends out the adjusting screw according to the radius of the ski. This means no vibration and thus an improved grip particularly on hard snow.

According to the use various construction types in light metal and plastic or other materials are used.

**4.1 Wedge variant 1** (see Fig. 25)

The travel of max. 30 mm is assumed by the travel multiplication and transferred to a carriage with rollers on which, on both sides there is milled a wedge of 15 degrees. This carriage is manufactured of light metal or plastic or other materials. The adjusting screw is extended via a lever arm of light metal or plastic or other materials, which from the wedge via a roller is actuated and fastened on the ski binding assembly plate via a joint. The extending travel is defined via the length of the lever arm, according to the lever principle.

**4.2 Wedge variant 2** (see Fig. 26)

The travel of max. 30 mm is transferred by the travel multiplication onto a wedge of light metal or another material which is guided on rollers. This actuates a roller which is incorporated in a round profile of light metal or another material. The round profile is screwed into a connection plate of light metal or another material which via pressed-in sleeves, of light metal or other materials, actuate the adjusting screw. The sleeves of light metal or of other materials run in plastic bearings which are pressed in the ski binding assembly plate.

**4.3 Wedge variant 3** (see Fig. 27)

The travel of max. 30 mm is transferred by the travel multiplication onto two wedges of light metal or other materials which are guided on rollers. These actuate rollers which by way of a U-profile of light metal or other materials are connected to one another below the ski binding assembly plate. Via this U-profile there are actuated the adjusting screws which are assembled in sleeves of light metal or other material. These sleeves run in plastic bearings which are pressed in the ski binding assembly plate. The adjusting screws with the wedge variant 2 and the wedge variant 3 in the idle condition may not project more that 15 mm from the ski binding assembly plate, otherwise they contact the ski shoe. Thus the travel is limited to approx. 12 mm. The wedge path must be cut out in the upper wall of the ski binding assembly plate. This is done away with when one selects a higher profile. Then also a greater travel may be ensured.

**5. Height adjustment** (see Fig. 4)

By way of the height adjustment of the ski binding assembly plate there results a lever principle which has the effect that one may put more pressure onto the front guide part of the ski. The results of this are a more precise momentum introduction, an improved stability and improved guide properties of the ski.

The height adjustment is manufactured of light metal or plastic or in other materials in the following variants.

**5.1 Height adjustment with bolts** (see Fig. 11)

It is realised with the construction type THP (see Fig. 1)

The front and the rear fastening consists of two tubes which are provided with various height adjusting holes so that they may be arrested into one another, at various positions by way of a height adjusting bolt.

**5.2 Height adjustment with thread** (see Fig. 12)

It is realised with the construction type THP (see Fig. 1)

The front and the rear fastening consists of two tubes which on one side may be provided with a fine thread so that they may be screwed into one another. The arresting on the ski binding assembly plate and on the ski is at the same time the height arresting in that the tubes with the threads may no longer be rotated.

**5.3 Height adjustment with a rotation disk** (see Fig. 13)

It is realised with the construction type THP (see Fig. 1)

With this variant there is provided a tube with an outer thread. In the ski binding assembly plate there is attached a rotation disk with in inner thread such that this may be rotated for the height adjustment.

**5.4 Height adjustment with a rotation knob** (see Fig. 14)

It is realised with the construction type THP (see Fig. 1)

This variant differs from the variant 5.3 height adjustment with a rotation disk (see Fig. 13) inasmuch as the rotation disk for the height adjustment is exchanged with a rotation knob which is fastend in the ski binding assembly plate with a circlip.

**5.5 Height adjustment with a rotation knob** (see Fig. 15)

It is realised with the construction type THP (see Fig. 1)

This variant differs from the variant 5.4 height adjustment with rotation knob, (see Fig. 14) inasmuch as the rotation knob is fastened within the ski binding assembly plate with a circlip. The rotation knob is arrested via an eccentric. The fastening on the ski is attached on the inside on the tube.

The Figs. 19, 20, 21 show variants in which the spring pressure may be adjusted. Here the height adjustment is effected via a steel pin with which one limits the spring path.

**5.6 Arresting on the ski**

The arresting on the ski is effected with tabs, as in the height adjustment 5.1 with bolts (see Fig. 11), or with a fastening block which is on the inside on the tube (see Fig. 12) or with a round flange (see Fig. 13), and bolts or screws or a quick closure so that the tubes may slightly incline. For this there is provided a slight milling on the tubes. The fixed point is defined in that one does not provide an milling on the tubes for the inclining.

**5.7 Height adjustment by way of hinges** (see Fig. 16)

It is realised in the construction type THP (see Fig. 1)

The front and the rear fastenings consist of hinges of light metal or other materials which are fastened on the ski binding assembly plate and on the ski such that these with the help of various height adjusting holes may be screwed together at various positions. The definition of the fixed point is effected via the fastening with an angle.

**5.8 Height adjustment with hinges and damping effect by way of leg or compression springs** (see Fig. 18)

This is realised with the constructional type THP (see Fig. 1)

The hinges are arranged such that the ski binding assembly plate may move in height. The height adjustment is effected via a height arresting screw.

**5.9 Height adjustment by way of a length compensation carriage and steel screws** (see Fig. 22)

It is realised with the construction type LCC (see Fig. 2)

The height adjustment of the ski binding assembly plate at the front or rear is effected via steel screws which are guided in a length compensation carriage over movable platelets of light metal and other materials and carriers on rollers. The fastening to the front and rear on the ski is effected via a fastening plate or with self-tapping insert bushings which are screwed directly in the ski and have an inner thread, or via force transition tabs. (see Fig. 32 force transmission system).

**5.10 Height adjustment by way of a rigid fastening and steel screws** (see Fig. 24)

It is realised with the construction type LCC (see Fig. 2)

On the counter side of the length compensation carriage on the ski binding assembly plate at the front or the rear there is effected a rigid fastening with steel screws which are attached such that via a movable plate they give way to the bending moment of the ski.

**5.11 Height adjustment by way of a length compensation carriage and plastic screws** (see Fig. 23)

It is realised with the construction type LCC (see Fig. 2)

The height adjustment of the ski assembly plate at the front and the rear is effected via plastic screws which have a slight elasticity and thus do not require a movable part in the length compensation carriage.

**5.12 Height adjustment by way of a rigid fastening and plastic screws** (see Fig. 24)

It is realised with the construction type LCC (see Fig. 2)

On the counter side of the length compensation carriage, on the ski binding assembly plate at the front and rear there is effected a rigid fastening with plastic screws via a reinforcement plate.

By way of the fastening of the ski binding assembly plate with plastic screws at the front and rear on the ski there is made possible the bending moment of the ski.

The fastening screws may in all fastenings be exchanged according to height adjustment.

**6. Inclination adjustment** (see Fig. 5)

By way of an inclination of the ski binding assembly plate up to approx. 20 degrees to the front the force, by way of the intrinsic body weight, which in the curve increases on account of centrifugal force, is additionally increased on the front guide part of the ski. There arises an enormous gripping ability by which means the reaction capability of the ski is increased. This gives a wonderful skiing and one may stick to curves as on rails. This effect may be fully exploited when carving.

**6.1. Inclination adjustment**

The adjustment of the inclination is effected via the same mechanisms as described in the height adjustment. It is effected in that the ski binding assembly plate in the front part of the ski is set lower.

**7. Damping effect** (see Fig. 6)

With the help of a damping system vibrations and knocks are accommodated. With a large jump the damping system assumes a large part of the muscle force. The skiing becomes softer and therefore lighter with regard to the bodily effort. One has an improved stability and running ability of the ski and thus may increase the speed. The damping effect simplifies also the turning of a curve, by which means this system is suitable for all types of skiers.

The damping system is manufactured of light metal or plastic or of other materials in the following variants.

**7.1 Damping effect by way of spring and air cylinder** (see Figs. 17, 19 20, 21)

It is realised with the construction type THP (see Fig. 1)

The front and rear fastening consists of two tubes which in size are selected such that they may be inserted into one another. Within the tubes there is installed a compression spring for the damping. The damping system may additionally be equipped with a pressure adjustment. In order to counteract a recoil effect there is provided a valve which lets the air within the tube quickly exit and ensures that the air with the unloading may only slowly flow into the tubes. This effect may however also take place via an expansion vessel which functions with air or oil. The height adjustment is effected via height arresting screws.

On the ski binding assembly plate and on the fastening tabs on the ski the tubes with a bolt or a screw or a quick closure are arrested such that they may slightly incline. For this there is provided a slight milling on the tubes. One of the four pivots must be defined as a fixed point in that one does not envisage a milling for the inclining.

**7.2 Damping effect by way of hinges and leg springs or compression springs** (see Fig. 18)

It is realised with the construction type THP (see Fig. 1)

The front fastening consists of hinges which are arranged such that a fixed point D and a pivot A may be ensured. The rear fastening consists of hinges which are arranged on the ski and on the ski binding assembly plate such that additionally to the pivots B and C there arises a free pivot. The resiliency is made possible with the help of leg springs or compression springs in the hinges or between the ski and the ski binding assembly plate.

In order to counteract a propelling-back effect an expansion vessel may be used which functions with air or oil or a shock absorber.

The height adjustment is effected via height arresting screws.

**7.3 Damping effect with 4 compression springs** (see Fig. 22, 23, 24)

It is realised with the construction type (LCC) (see Fig. 2)

The fastening of ski binding assembly plate and ski are effected as is described with the height adjustment: (see Fig. 22, 23, 24)

5.9 Height adjustment by way of a length compensation carriage

5.10 Height adjustment by way of rigid fastening and steel screws

5.11 Height adjustment by way of a length compensation carriage and plastic screws.

5.12 Height adjustment by way of a rigid fastening and plastic screws.

The screws however have a shank which in the length compensation carriage or in the rigid fastening are mounted such that a travel is permitted. The screws are equipped with compression springs. In order to counteract a jamming in the travel, additionally hinges or pantographs transverse to the skiing direction are applied.

In order to counteract a propelling-back effect an expansion vessel may be applied which functions with air or oil, or a shock absorber.

The height adjustment is effected via height adjusting screws.

**7.4 Damping effect with pantograph**

It is realised with the construction type RSP (see Fig. 1)

The fastening at the front and rear on the ski is effected with in each case one pantograph which is installed transverse to the skiing direction so that a fixed point and 3 rotational points are ensured. These two pantographs are equipped with compression and tension springs. In order to counteract a recoil effect an expansion vessel may be used which functions with air or oil, or a shock absorber.

The height adjustment is effected via height adjusting screws.

## Embodiment examples

### 1st Example

The ski binding assembly plate is fixed or adjustable in height, in inclination and in length and is always provided with a two-point support and arrest system. Additionally it may be equipped with a force transmission system or travel multiplication system or with a wedge function or a height adjustment system or inclination angle adjusting system or a damping system or in combinations with the various systems. It is manufactured of light metal or plastic profiles or profiles of other materials (rectangular tube, U-profile, C-profile) which may be glued above and below as a reinforcement to a steel plate, plastic plate or other materials. It may also be manufactured in cast moulds with light metal or other materials.

It is manufactured in the construction type THP (tubes, hinges or pantograph). (see Fig. 1)

This construction type is constructed with rods or hinges of light metal or plastic or other materials in that a fixed pont (D) and three pivots (A,B,C) are applied. These pivots (A,B,C) permit a length compensation. The fixed point (D) serves for fixing the ski binding assembly plate. The fixed point may be defined at any point (A,B,C,D) according to use.

Or it is realised with construction type type LCC (length compensation carriage) (see Fig. 2)

The construction type is characterised by the application of a length compensation carriage which is applied in the ski binding assembly plate according to the construction type, at the front or the rear. The length compensation carriage reacts to force actions which only act on the ski at the front, as well as force actions which only act on the ski at the rear, as well as to force actions which act at the front as well as the rear. This length compensation is the basis for realising the wedge function. It is manufactured in light metal or in other materials.

### 2nd Example

The ski binding assembly plate is provided with a two-point support and arrest system. The two point support and arrest system gives the ski a free bending moment. This means that the ski has on its whole length, also in the region of the binding the possibility of freely deflecting. "Two-point" indicates the support at the front and rear on the ski at which the ski binding assembly plate is fastened by way of a length compensation carriage and via a rigid fastening, and not the assembly points of the plate, whose number may be varied according to the construction type.



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**The two-point support and arrest system is realised with the construction type LCC.** (see Fig. 2)

It is manufactured with a length compensation carriage with steel screws. (see Fig. 22). The steel screws for fastening the ski binding assembly pate on the ski are mounted with two aluminium or steel platelets or other materials which may move in the axial direction. These platelets are guided over aluminium or steel carriers or other materials, by way of two axles, on rollers.

On the counter side of the length compensation carriage on the ski binding assembly plate at the front and rear there is effected a rigid fastening with steel screws which are attached such that they via a movable plate yield to the bending moment of the ski. (see Fig. 24)

Or the two-point support and arrest system is manufactured with a length compensation carriage with plastic screws. (See Fig. 23)

The plastic screws for fastening the ski binding assembly plate on the ski permit on account of their elasticity for the length compensation carriage in inclination to be adapted to the bending moment. For obtaining the strength larger screws are used.

On the counter side of the length compensation carriage on the ski guide pressure intensifier plate at the front and rear there is effected a rigid fastening with plastic screws or an intensifier plate. (see Fig. 24)

By way of the fastening of the ski binding assembly plate with plastic screws at the front and rear on the ski, the bending moment of the ski is made possible. The fastening screws may be exchanged in all fastenings, according to the height adjustment.

**Or the two-point support and arrest system is realised with the constuction type THP.** (See Fig. 1)

This construction type is manufactured in light metal or plastic or in other materials in the following variants.

<u>Height adjustment with bolts</u> (see Fig. 11)

The front and the rear fastening consists of two tubes which are provided with various height adjusting holes so that they may be arrested into one another, at various positions by way of a height adjusting bolt.

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Or height adjustment with thread (see Fig. 12)

The front and the rear fastening consists of two tubes which on one side may be provided with a fine thread so that they may be screwed into one another. The arresting on the ski binding assembly plate and on the ski is at the same time the height arresting in that the tubes with the threads may no longer be rotated.

Or height adjustment with a rotation disk (see Fig. 13)

With this variant there is provided a tube with an outer thread. In the ski binding assembly plate there is attached a rotation disk with an inner thread such that this may be rotated for the height adjustment.

Or height adjustment with a rotation knob (see Fig. 14)

This variant differs from the variant height adjustment with a rotation disk inasmuch as the rotation disk for the height adjustment is exchanged with a rotation knob which is fastened in the ski binding assembly plate with a circlip.

Or height adjustment with a rotation knob (see Fig. 15)

This variant differs from the variant height adjustment with rotation knob, (see Fig. 14), inasmuch as the rotation knob is fastened within the ski binding assembly plate with a circlip. The rotation knob is arrested via an eccentric. The fastening on the ski is attached on the inside on the tube.

The arresting on the ski is effected with tabs, as in the height adjustment with bolts (see Fig. 11), or with a fastening block which is on the inside on the tube (see Fig. 12) or with a round flange (see Fig. 13), and bolts or screws or a quick closure so that the tubes may slightly incline. For this there is provided a slight milling on the tubes. The fixed point is defined in that one does not provide a milling on the tubes for the inclining.

Or height adjustment by way of hinges (see Fig. 16)

The front and the rear fastenings consist of hinges of light metal or other materials which are fastened on the ski binding assembly plate and on the ski such that these with the help of various height adjusting holes may be screwed together at various positions. The definition of the fixed point is effected via the fastening at an angle.

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Or height adjustment with hinges and damping effect by way of leg or compression springs (see Fig. 18)

The hinges are arranged such that the ski binding assembly plate may move in height. The height adjustment is effected via a height arresting screw.

**3rd Example**

With the ski binding assembly plate the guide pressure point FD1 lies in the region of 25 cm to 50 cm, measured from the assembly point in the middle of the ski shoe up to the rear guide pressure point FD2. (see Fig. 35)

**4th Example**

The ski binding assembly plate is equipped with a force transmission system. (see Fig. 32)
The free bending moment is ensured by way of the force transmission function in that the force action F6 according to the curve via a pivot according to the lever principle is converted into a resulting force F5 which lifts the counter pressure F4. The length of the force transmission tabs is on account of the force ratio defined according to the lever principle. With an adjusting screw the height is adjusted and a fine adaptation of the ski is carried out. (see Fig. 33, force transmission function)
This system effects additionally to the free bending moment, less vibration and thus a better grip, particularly on hard snow.

The force transmission tabs are manufactured in light metal or plastic or other materials and rigidly screwed on the front part or rear part of the ski. A plastic U-disk ensures a slight bending moment. By way of the bending moment of the ski between the tab and the ski there arises a length distance of up to 2 mm. This length compensation is milled in the tabs by way of longitudinal grooves in the direction of the middle of the ski. The fastening is effected with special flat head shank screws and a plastic U-disk in order to ensure a slight bending moment and a smaller friction for the length compensation. Instead of the plastic U-disk the friction may be lifted with a roller which runs in a groove transversely to the length compensation. (see Fig. 32, force transmission system)

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**5th Example**

The ski binding assembly plate is equipped with a travel multiplication in the following construction type: (see Fig. 28, 30, 31)

The travel multiplication multiplies the reaction force of the length compensation carriage from max. 8 mm to a travel of approx. 30 mm. According to the construction type of the wedge function this is converted into a co-running or counter-running direction. It may according to the requirement of the wedge function be assembled at various positions in the plate. The force transmission is effected via light metal tabs or tabs manufactured of other materials which are arranged according to the lever principle.

Or travel multiplication with a gearwheel gear

This variant is manufactured with a gearwheel gear.

The force transmission is transmitted via a gearwheel gear with a rack of plastic or other materials.

Or travel multiplication with a tension or compression spring

In order to counteract the inertia of the whole system of the ski, on the force transmission lever a tension or compression spring may be placed.

Or the travel multiplication is equipped with an implemented wedge

In the travel multiplication there is co-implemented a wedge function of light metal or other materials in order to prevent a propelling-back of the forces. This is necessary for the application of a pantograph of light metal or other materials.

**6th Example**

The ski binding assembly plate is equipped with a wedge function (see Fig. 34)

The wedge function lifts the unfavourable bending moment which arises by way of the counter pressure F4. The initial point is the length compensation carriage which reacts to the smallest force action F6 according to the curve (reaction path up to approx. 8 mm). This path of 1-8 mm is multiplied via the travel multiplication to max. 30 mm. The 30 mm correspond to the



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maximum required wedge movement. The wedge has an inclination of 15 degrees and thus a good precondition for the force transmission onto the adjusting screw. This is required for the height adjustment and for a fine adaptation of the ski.

Reversely the counter force F4 acts from the ground or the snow at an angle of 75 degrees onto the wedge and is thus not in the position of influencing the wedge. Thus the propelling-back force is eliminated. The free bending moment is ensured by the wedge which extends out the adjusting screw according to the radius of the ski. This means no vibration and thus an improved grip particularly on hard snow.
According to the use various construction types in light metal and plastic or other materials are used.

Wedge variant 1 (see Fig. 25)
The travel of max. 30 mm is assumed by the travel multiplication and transferred to a carriage with rollers on which, on both sides there is milled a wedge of 15 degrees. This carriage is manufactured of light metal or plastic or other materials. The adjusting screw is extended via a lever arm of light metal or plastic or other materials, which from the wedge via a roller is actuated and fastened on the ski binding assembly plate via a joint. The extending travel is defined via the length of the lever arm, according to the lever principle.

Or wedge variant 2 (see Fig. 26)
The travel of max. 30 mm is transferred by the travel multiplication onto a wedge of light metal or another material which is guided on rollers. This actuates a roller which is incorporated in a round profile of light metal or another material. The round profile is screwed into a connection plate of light metal or another material which via pressed-in sleeves, of light metal or other materials, actuate the adjusting screw. The sleeves of light metal or of other materials run in plastic bearings which are pressed in the ski binding assembly plate.

Or wedge variant 3 (see Fig. 27)
The travel of max. 30 mm is transferred by the travel multiplication onto two wedges of light metal or other materials which are guided on rollers. These actuate rollers which by way of a U-profile of light metal or other materials are connected to one another below the ski binding assembly plate. Via this U-profile there are actuated the adjusting screws which are assembled in sleeves of light metal or other material. These sleeves run in plastic bearings which are pressed in



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the ski binding assembly plate. The adjusting screws with the wedge variant 2 and the wedge variant 3 in the idle condition may not project more that 15 mm from the ski binding assembly plate, otherwise they contact the ski shoe. Thus the travel is limited to approx. 12 mm. The wedge path must be cut out in the upper wall of the ski binding assembly plate. This is done away with when one selects a higher profile. Then also a greater travel may be ensured.

**7th Example**

The ski binding assembly plate is equipped with a height adjustment (see Fig. 1).

The height adjustment is manufactured of light metal or plastic or in other materials in the following variants.

Height adjustment with bolts (see Fig. 11)
It is realised with the construction type THP (see Fig. 1)
The front and the rear fastening consists of two tubes which are provided with various height adjusting holes so that they may be arrested into one another, at various positions by way of a height adjusting bolt.

Or height adjustment with a thread (see Fig. 12)
It is realised with the construction type THP (see Fig. 1)
The front and the rear fastening consists of two tubes which on one side may be provided with a fine thread so that they may be screwed into one another. The arresting on the ski binding assembly plate and on the ski is at the same time the height arresting in that the tubes with the threads may no longer be rotated.

Or height adjustment with a rotation disk (see Fig. 13)
It is realised with the construction type THP (see Fig. 1)
With this variant there is provided a tube with an outer thread. In the ski binding assembly plate there is attached a rotation disk with an inner thread such that this may be rotated for the height adjustment.

Or height adjustment with a rotation knob (see Fig. 14)
It is realised with the construction type THP (see Fig. 1)



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This variant differs from the variant height adjustment with a rotation disk (see Drawing No. 9) inasmuch as the rotation disk for the height adjustment is exchanged with a rotation knob which is fastened in the ski binding assembly plate with a circlip.

Or height adjustment with a rotation knob (see Fig. 15)

It is realised with the construction type THP (see Fig. 1)

This variant differs from the variant height adjustment with rotation knob, (see Fig. 14) inasmuch as the rotation knob is fastened within the ski binding assembly plate with a circlip. The rotation knob is arrested via an eccentric. The fastening on the ski is attached on the inside on the tube.

The Figs. 19, 20, 21 show variants in which the spring pressure may be adjusted. Here the height adjustment is effected via a steel pin with which one limits the spring path.

Arresting on the ski

The arresting on the ski is effected with tabs, as in the height adjustment with bolts (see Fig. 11), or with a fastening block which is on the inside on the tube (see Fig. 12) or with a round flange (see Fig. 13), and bolts or screws or a quick closure so that the tubes may slightly incline. For this there is provided a slight milling on the tubes. The fixed point is defined in that one does not provide a milling on the tubes for the inclining.

Height adjustment by way of hinges (see Fig. 16)

It is realised in the construction type THP (see Fig. 1)

The front and the rear fastenings consist of hinges of light metal or other materials which are fastened on the ski binding assembly plate and on the ski such that these with the help of various height adjusting holes may be screwed together at various positions. The definition of the fixed point is effected via the fastening with an angle.

Or height adjustment with hinges and damping effect by way of leg or compression springs (see Fig. 18)

This is realised with the constructional type THP (see Fig. 1)

The hinges are arranged such that the ski binding assembly plate may move in height. The height adjustment is effected via a height arresting screw.



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Or height adjustment by way of a length compensation carriage and steel screws (see Fig. 22)
It is realised with the construction type LCC (see Fig. 2)
The height adjustment of the ski binding assembly plate at the front or rear is effected via steel screws which are guided in a length compensation carriage over movable platelets of light metal and other materials and carriers on rollers. The fastening to the front and rear on the ski is effected via a fastening plate or with self-tapping insert bushings which are screwed directly in the ski and have an inner thread, or via force transmission tabs. (see Fig. 32 force transmission system).

Or height adjustment by way of a rigid fastening and steel screws (see Fig. 24)
It is realised with the construction type LCC (see Fig. 2)
On the counter side of the length compensation carriage on the ski binding assembly plate at the front or the rear there is effected a rigid fastening with steel screws which are attached such that via a movable plate they give way to the bending moment of the ski.

Or height adjustment by way way of a length compensation carriage and plastic screws (see Fig. 23)
It is realised with the construction type LCC (see Fig. 2)
The height adjutment of the ski assembly plate at the front and the rear is effected via plastic screws which have a slight elasticity and thus do not require a movable part in the length compensation carriage.

Or height adjustment by way of a rigid fastening and plastic screws (see Fig. 24)
It is realised with the constructon type LCC (see Fig. 2)
On the counter side of the length compensation carriage, on the ski binding assembly plate at the front and rear there is effected a rigid fastening with plastic screws via a reinforcement plate.

By way of the fastening of the ski binding assembly plate with plastic screws at the front and rear on the ski there is made possible the bending moment of the ski.
The fastening screws may in all fastenings be exchanged according to height adjustment.

**8th Example**

The ski binding assembly plate is equipped with an inclination angle adjustment. (see Fig. 5)



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Inclination angle adjustment

The adjustment of the inclination is effected via the same mechanisms as is described with the height adjustment. It is effected in that the ski binding assembly plate in the front part of the ski is adjusted lower.

**9th Example**

Ski binding assembly plate according to claim 1 and claim 2 and claim 3 and or claim 4 and or claim 5 and or claim 6 and or claim 7 and or claim 8, characterised in that it is equipped with a damping effect. (see Fig. 6)

The damping system is manufactured of light metal or plastic or of other materials in the following variants.

Damping effect by way of spring and air cylinder (see Figs. 17, 19 20, 21)

It is realised with the construction type THP (see Fig. 1)

The front and rear fastening consists of two tubes which in size are selected such that they may be inserted into one another. Within the tubes there is installed a compression spring for the damping. The damping system may additionally be equipped with a pressure adjustment. In order to counteract a recoil effect there is provided a valve which lets the air within the tube quickly exit and ensures that the air with the unloading may only slowly flow into the tubes. This effect may however also take place via an expansion vessel which functions with air or oil. The height adjustment is effected via height arresting screws.

On the ski binding assembly plate and on the fastening tabs on the ski the tubes with a bolt or a screw or a quick closure are arrested such that they may slightly incline. For this there is provided a slight milling on the tubes. One of the four pivots must be defined as a fixed point in that one does not envisage a milling for the inclining.

Or damping effect by way of hinges and leg springs or compression springs (see Fig. 18)

It is realised with the construction type THP (see Fig. 1)

The front fastening consists of hinges which are arranged such that a fixed point D and a pivot A may be ensured. The rear fastening consists of hinges which are arranged on the ski and on the ski binding assembly plate such that additionally to the pivots B and C there arises a free pivot.



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The resiliency is made possible with the help of leg springs or compression springs in the hinges or between the ski and the ski binding assembly plate.
In order to counteract a propelling-back effect an expansion vessel may be used which functions with air or oil or a shock absorber.
The height adjustment is effected via height arresting screws.

Or damping effect with 4 compression springs (see Fig. 22, 23, 24)
It is realised with the construction type (LCC) (see Fig. 2)
The fastening of ski binding assembly plate and ski are effected as is described with the height adjustment: (see Fig. 22, 23, 24)
5.9 Height adjustment by way of a length compensation carriage
5.10 Height adjustment by way of rigid fastening and steel screws
5.11 Height adjustment by way of a length compensation carriage and plastic screws.
5.12 Height adjustment by way of a rigid fastening and plastic screws.
The screws however have a shank which in the length compensation carriage or in the rigid fastening are mounted such that a travel is permitted. The screws are equipped with compression springs. In order to counteract a jamming in the travel, additionally hinges or pantographs transverse to the skiing direction are applied.
In order to counteract a propelling-back effect an expansion vessel may be applied which functions with air or oil, or a shock absorber.
The height adjustment is effected via height adjusting screws.

Or damping effect with pantograph
It is realised with the construction type RSP (see Fig. 1)
The fastening at the front and rear on the ski is effected with in each case one pantograph which is installed transverse to the skiing direction so that a fixed point and 3 rotational points are ensured. These two pantographs are equipped with compression and tension springs. In order to counteract a propelling-back effect an expansion vessel may be used which functions with air or oil, or a shock absorber.
The height adjustment is effected via height adjusting screws.

**10th Example**

The ski binding assembly plate is manufactured as a standard embodiment. (see Fig. 7, 8)



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This embodiment design may not be adjusted in height and in inclination. It is manufactured according to use. In the world cup at present there is prescribed a 5.5 cm height from the lower edge of the ski to the lower edge of the ski shoe. For the carving region a higher version is considered. It is equipped with a two-point support and arrest system and a force compensation system. Additionally it may be equipped with a damping system.
It is equipped with or without length compensation rollers.

**11th Example**

A ski binding assembly plate is manufactured as an adjustable standard embodiment.
(see Fig. 1, 2)

This embodiment may be adjusted in height, in inclination and in length. It contains always a two-point support and arrest system, and according to use may be supplemented with a force transition system or a wedge function or in combination with both systems with a damping system.

**12th Example**

The ski binding assembly plate is manufactured as an embodiment integrated in the ski binding (see Fig. 9, 10)

This embodiment is the same as the standard embodiment or the adjustable embodiment, however it is integrated directly into the ski binding. The ski binding assembly plate is at the same time the guide rail for the adjustment of the ski binding.

**13th Example**

The ski binding assembly plate and the fastenings on the ski are manufactured of one piece in plastic or other materials or together with other materials. It is not meant that the ski binding assembly plate does not consist of several components such as for example height adjusting screws, length compensation carriage, etc., but that it with the arrest parts on the ski is a plastic cast part or a cast part of other materials.



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**14th Example**

The ski binding assembly plate is manufactured as an embodiment for snow boards.
This embodiment is the same as the standard embodiment or the adjustable embodiment, however is adapted to the width of the snowboard.

This embodiment is the same as the standard embodiment or the adjustable embodiment but adapted to the width of the snowboard.



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**List of components**

| | |
|---|---|
| 1) | ski guide pressure intensifier plate (ski binding assembly plate) |
| 2) | tubes of light metal or plastic |
| 2.1) | tubes of light metal or plastic with a fine thread |
| 2.2) | tubes of light metal or plastic |
| 2.3) | hinges of light metal or plastic |
| 3.1) | height adjusting bolts |
| 3.2) | height adjusting hole |
| 4) | fastening tab of angled light metal or U-profile |
| 4.1) | fastening disk of light metal or plastic |
| 4.2) | fastening on the ski in the inside of the tube |
| 4.3) | the outer tube must be slotted below |
| 4.4) | on the outer tube milling a flange on both sides |
| 5) | ski (of any type) |
| 6) | fastening screws |
| 7) | rubber or plastic ring |
| 8) | height adjusting by way of an light metal or plastic tube |
| 8.1) | height adjustment |
| 9) | pressure spring of spring steel |
| 9.1) | leg spring of spring steel |
| 9.2) | pressure adjustment |
| 9.3) | travel |
| 10) | air cylinder |
| 10.1) | valve |
| 10.2) | piston of light metal or plastic |
| 11) | angle profile of light metal or plastic |
| 12) | plastic inlay |
| 13) | distance disk |
| 14) | rotation knob |
| 15) | arresting screw |
| 16) | circlip |
| 17) | press seat |
| 18) | tensioning pin |



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18.1) tensioning pin (stainless)

19) eccentric for arresting the rotation knob

20) plastic screw

21) wedge

21.1) extended wedge

21.2) wedge in normal position

21.3) wedge on rollers

21.4) wedge travel cut out

22) fixed points

23) tension spring

24) fastening on the ski

24.1) fastening on the ski with height adjustment

25) force transmission tab

26) length compensation

26.1) length compensation carriage

27) length compensation via rollers

28) plastic bearing

29) ski binding head

30) connection to heel automatic device

31) heel automatic device

32) connection to heel automatic device

33) rotational point fixed or adjustable on guide rail

34) guide rail for adjusting the ski binding

35) rollers

36) axles

37) front and rear the same jacks

38) carrier

39) movable platelet

40) movable plate

41) rigid plate

42) joint

43) adjusting screw

44) connection plate

45) light metal or plastic sleeves



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46) plastic bushings

47) round profile

48) U-profile

49) path for panto-legs cut in

50) fixed point

51) pivots

52) pivots according to the lever principle

53) conventional binding

54) binding with ski guide pressure intensifier plate

55) force transmission system

56) travel multiplcation

57) length compenstion carriage with fastening on the ski

58) wedge functions

59) rotation disk

**Important points**

A) pivot A

B) pivot B

C) pivot C

D) fixed point D

E) free pivot

**Texts**

T1 The length of the force transmission tabs is on account of the force ratio defined according to the lever principle.

T2 The free bending moment is ensured by way of the force transmission function.

T3 Unfavourable bending moment

T4 The free bending moment is limited by the counter pressure F4.

T5 Unfavourable bending moment.

T6 Adjusting screw extended by way of the wedge.



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T7 The free bending moment is ensured by way of the wedge which according to the deflection of the ski is extended according to the curve.

T8 Vibration-damping lever effect.

T9 Properties: improved ski guiding, less vibration, greater running smoothness.

**Forces**

FD1 front guide pressure point

FD2 rear guide pressure point

F3 intrinsic weight and centrifugal force F3 in the curve

F4 counter pressure

F5 resulting force F5 according to the lever principle, which lifts the counter pressure F4 according to the respective radius of the curve.

F6 force effect F6 according to the curve



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The embodiments of the invention in which an exclusive property or privilege is claimed are defined as follows:

1. An interface device between a shoe and a ski sport apparatus, having a ski guide pressure intensifier plate for receiving the shoe, the ski guide pressure intensifier plate defining a plate plane and a longitudinal direction running in the plate plane, a first and a second fastening element which in the longitudinal direction are distanced from one another and each form a connection to the ski sport apparatus, a first connection between the first fastening element and the ski guide pressure intensifier plate, wherein the first connection contains a first joint, a second connection between the second fastening element and the ski guide pressure intensifier plate, wherein the second connection contains a second joint, and compensation means for compensating a distance change between the first and the second fastening element, the interface device comprising:

action means for forming external forces acting on the ski support apparatus that depend on a given bending of the ski sport apparatus and for maintaining largely intact a bending line of the ski sport apparatus below the ski guide pressure intensifier plate, independent of forces acting on the ski guide pressure intensifier plate and the ski sport apparatus.

2. An interface device according to claim 1, wherein the action means comprise a travel multiplication.

3. An interface device according to claim 1 or 2, wherein the action means transmit a bending moment from a ski sport apparatus region outside the ski guide pressure intensifier plate into the ski sport apparatus below the ski guide pressure intensifier plate.

4. An interface device according to any one of claims 1 to 3, wherein the ski sport apparatus is a ski or a snow board.

5. An interface device according to any one of claims 1 to 4, wherein the compensation means comprise a guide direction that is parallel to the longitudinal direction.

6. An interface device according to any one of claims 1 to 5, wherein a joint and the compensation means form a jointed guide.

7. An interface device according to any one of claims 1 to 6, wherein the compensation means comprise an additional joint which cooperates with one of the first joint and the second joint.

8. An interface device according to any one of claims 1 to 7, wherein at least one of the first joint and the second joint is one of a turning joint and an elastic joint.

9. An interface device according to any one of claims 1 to 8, wherein the first and second joints permit only rotations about axes parallel to a plate plane and perpendicular to the longitudinal direction.

10. An interface device according to any one of claims 1 to 9, wherein in a region of at least one of the fastening elements there is adjustment means for adjusting a height of the ski guide pressure intensifier plate.

11. An interface device according to any one of claims 1 to 10, wherein in a region of at least one of the fastening elements there is adjustment means for adjusting an inclination angle of the ski guide pressure intensifier plate with respect to the ski sport apparatus.

12. An interface device according to any one of claims 1 to 11, further comprising third adjustment means for adjusting a mutual distance of the fastening elements.

13. An interface device according to any one of claims 1 to 12, wherein in a region of at least one of the fastening elements there is one of a compression spring and a tension spring for forming a resiliency between the ski guide pressure intensifier plate and the ski sport apparatus.

14. An interface device according to any one of claims 1 to 13, wherein in a region of at least one of the fastening elements there is one of an air cylinder and an oil cylinder for

forming a shock absorbing between the ski guide pressure intensifier plate and the ski sport apparatus.

15. An interface device according to any one of claims 1 to 14, wherein the ski pressure intensifier plate is one of fastened to a binding and is integrated into the binding.

16. An interface device according to any one of claims 1 to 15, wherein the ski guide pressure intensifier plate comprises a receiving region for receiving a ski shoe aligned in the longitudinal direction and the first fastening element lies at a distance of 25-50 cm, measured forwards in the longitudinal direction, from a middle of the receiving region, and the second fastening element at a distance of 25-40 cm, measured to the rear in the longitudinal direction, from the middle of the receiving region.

17. An interface device according to any one of claims 1 to 16, wherein the ski guide pressure intensifier plate and at least one of the fastening elements and the compensation means are manufactured as one piece.

18. An interface device according to any one of claims 1 to 17, wherein the interface device is used as a binding for the ski sport apparatus.

19. An interface device according to any one of claims 1 to 18, wherein at least one of the joints, the compensation means and the action means are intergrated in the ski sport apparatus.

20. An interface device according to any one of claims 1 to 19, wherein the action means comprise a region of the ski sport apparatus having one of a higher flexibility and a lower flexibility than another region of the ski sport apparatus.

21. An interface device between a shoe and a ski sport apparatus, having a ski guide pressure intensifier plate for receiving the shoe, the ski guide pressure intensifier plate defining a plate plane and a longitudinal direction running in the plate plane, a first and a second fastening element which in the longitudinal direction are distanced from one another and each form a connection to the ski sport apparatus, a first connection between

the first fastening element and the ski guide pressure intensifier plate, wherein the first connection contains a first joint, a second connection between the second fastening element and the ski guide pressure intensifier plate, wherein the second connection contains a second joint, and compensation means for compensating a distance change between the first and the second fastening element, the improvement comprising:

action means, which given a bending of the ski sport apparatus form external forces acting on the ski sport apparatus, for maintaining largely intact a bending line of the ski sport apparatus below the ski guide pressure intensifier plate, independent of forces acting on the ski guide pressure intensifier plate, the action means transmitting a turning moment from a ski sport apparatus region outside the ski guide pressure intensifier plate into the ski sport apparatus below the ski guide pressure intensifier plate, and the action means comprise at least one tab suitable for fastening in the longitudinal direction one of on and in the ski sport apparatus.

22. An interface device according to claim 21, wherein the compensation means comprise a guide with a guide direction that is parallel to the longitudinal direction.

23. An interface device according to claim 22, wherein a joint and the compensation means form a jointed guide.

24. An interface device according to claim 23, wherein the compensation means comprise an additional joint which cooperates with one of the first joint and the second joint.

25. An interface device according to claim 24, wherein at least one of the first joint and the second joint is one of a turning joint and an elastic joint.

26. An interface device according to claim 25, wherein the first and second joints permit only rotations about axes parallel to a plate plane and perpendicular to the longitudinal direction.

27. An interface device according to claim 26, wherein in a region of at least one of the fastening elements there is first adjustment means for adjusting a height of the ski guide pressure intensifier plate.

28. An interface device according to claim 27, wherein in the region at least of one of the fastening elements there is a second adjustment means for adjusting an inclination angle of the ski guide pressure intensifier plate with respect to the ski sport apparatus.

29. An interface device according to claim 28, further comprising third adjustment means for adjusting a mutual distance of the fastening elements.

30. An interface device according to claim 29, wherein in the region of at least one of the fastening elements there is one of a compression spring and a tension spring for forming a resiliency between the ski guide pressure intensifier plate and the ski sport apparatus.

31. An interface device according to claim 30, wherein in the region of at least one of the fastening elements there is one of an air cylinder and an oil cylinder for forming a shock absorbing between the ski guide pressure intensifier plate and the ski sport apparatus.

32. An interface device according to claim 31, wherein the ski pressure intensifier plate is one of fastened to a binding and is integrated into the binding.

33. An interface device according to claim 32, wherein the ski guide pressure intensifier plate comprises a receiving region for receiving a ski shoe aligned in the longitudinal direction and the first fastening element lies at a distance of 25-50 cm, measured forwards in the longitudinal direction, from a middle of the receiving region, and the second fastening element at a distance of 25-40 cm, measured to the rear in the longitudinal direction, from the middle of the receiving region.

34. An interface device according to claim 33, wherein the ski guide pressure intensifier plate and at least one of the fastening elements and the compensation means are manufactured as one piece.

35. An interface device between a shoe and a ski sport apparatus, having a ski guide pressure intensifier plate for receiving the shoe, the ski guide pressure intensifier plate defining a plate plane and a longitudinal direction running in the plate plane, a first and a second fastening element which in the longitudinal direction are distanced from one another and each form a connection to the ski sport apparatus, a first connection between the first fastening element and the ski guide pressure intensifier plate, wherein the first connection contains a first joint, a second connection between the second fastening element and the ski guide pressure intensifier plate, wherein the second connection contains a second joint, and compensation means for compensating a distance change between the first and the second fastening element, the improvement comprising:

action means, which given a bending of the ski sport apparatus form external forces acting on the ski sport apparatus, for maintaining largely intact a bending line of the ski sport apparatus below the ski guide pressure intensifier plate, independent of forces acting on the ski guide pressure intensifier plate, wherein the action means are integrated in the ski sport apparatus, the action means comprise at least one tab mounted in the ski sport apparatus in the longitudinal direction, and the ski sport apparatus is one of a ski and a snow board.

36. A ski sport apparatus containing the interface device according to any one of claims 1 to 35.

37. A ski sport apparatus according to claim 36, wherein at least one of the joints, the compensation means and/or the action means are intergrated in the ski sport apparatus.

38. A ski sport apparatus according to claim 36 or 37, wherein the action means are integrated in the ski sport apparatus, and are preferably designed as at least one tab that is mounted in the ski sport apparatus in the longitudinal direction, or wherein the action means are designed as a region of the ski sport apparatus with a higher or lower flexibility.

39. Binding for a ski sport apparatus, comprising the interface device according to any one of claims 1 to 35.

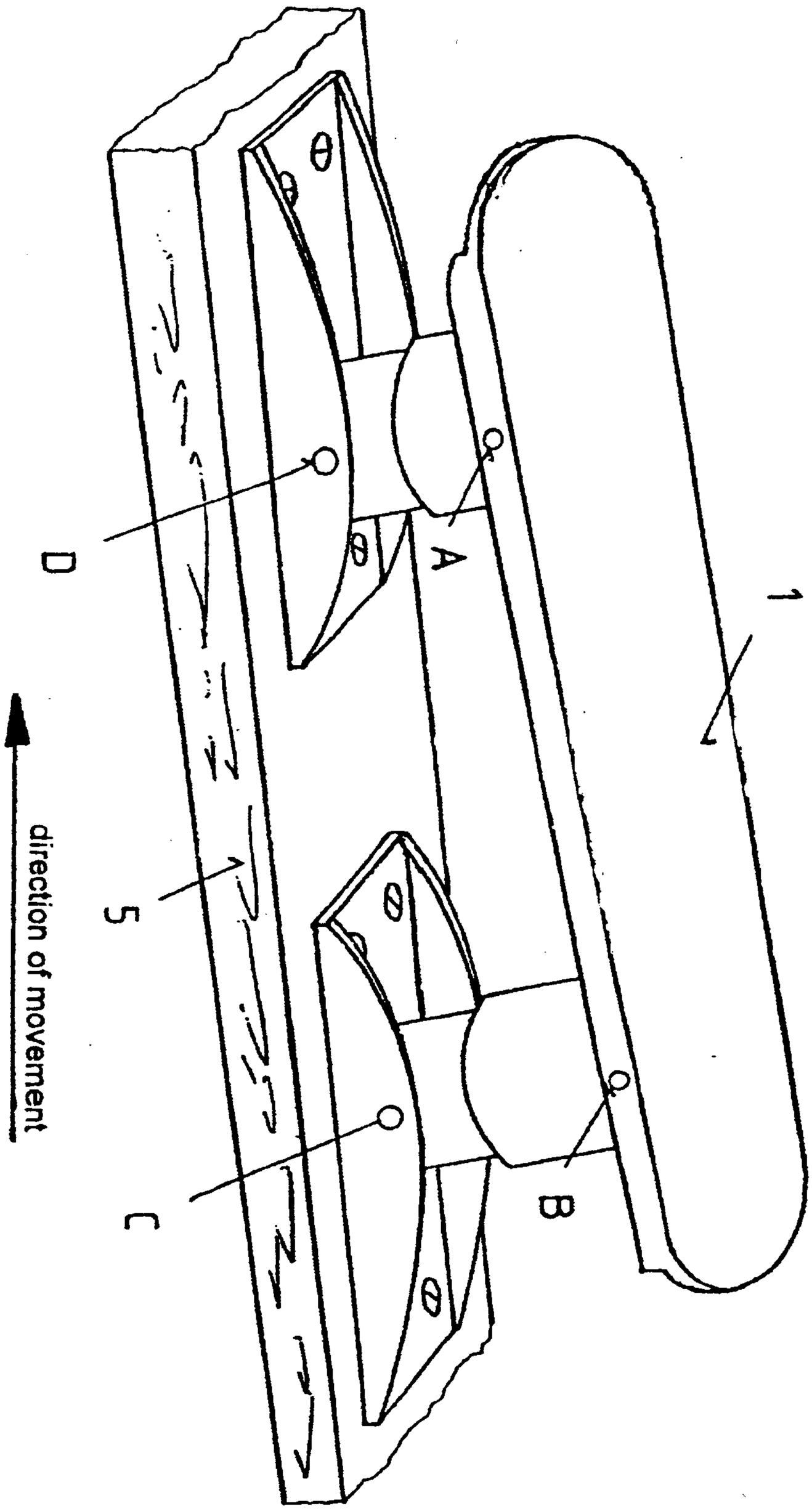
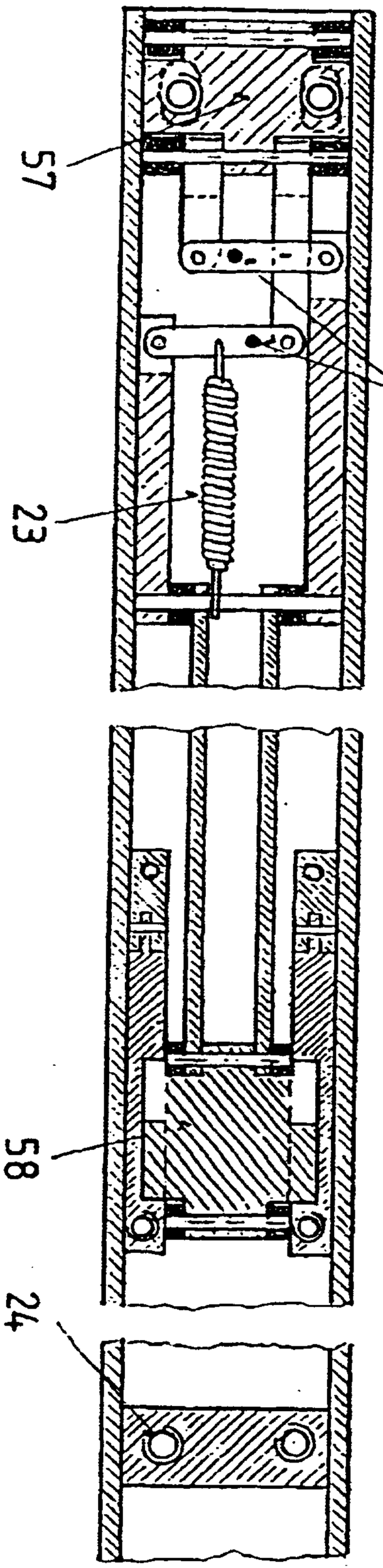



FIG. 1

Ski guide pressure intensifier plate (Snow-Speed)



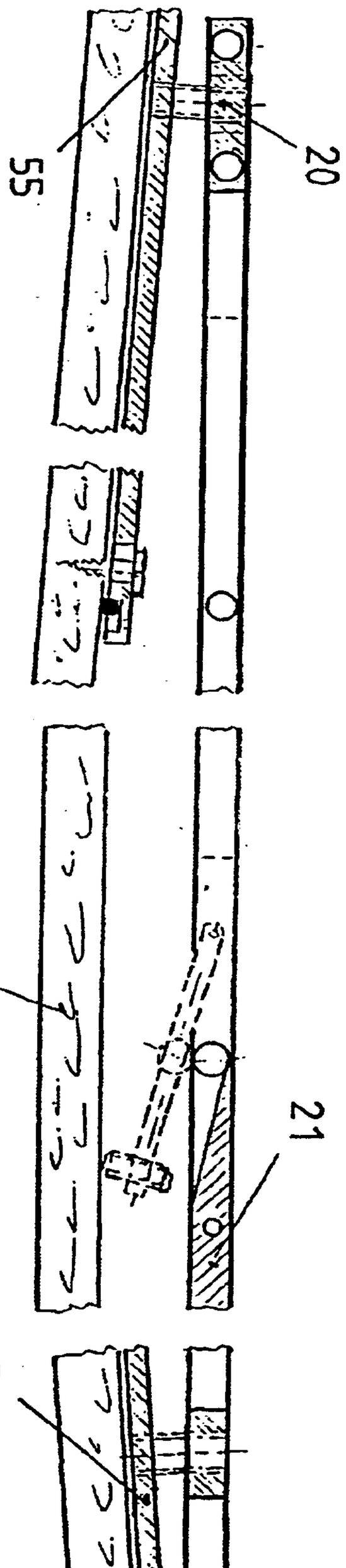




FIG. 2

Arrangement of the functions

FIG. 3

2-point support and arrest system

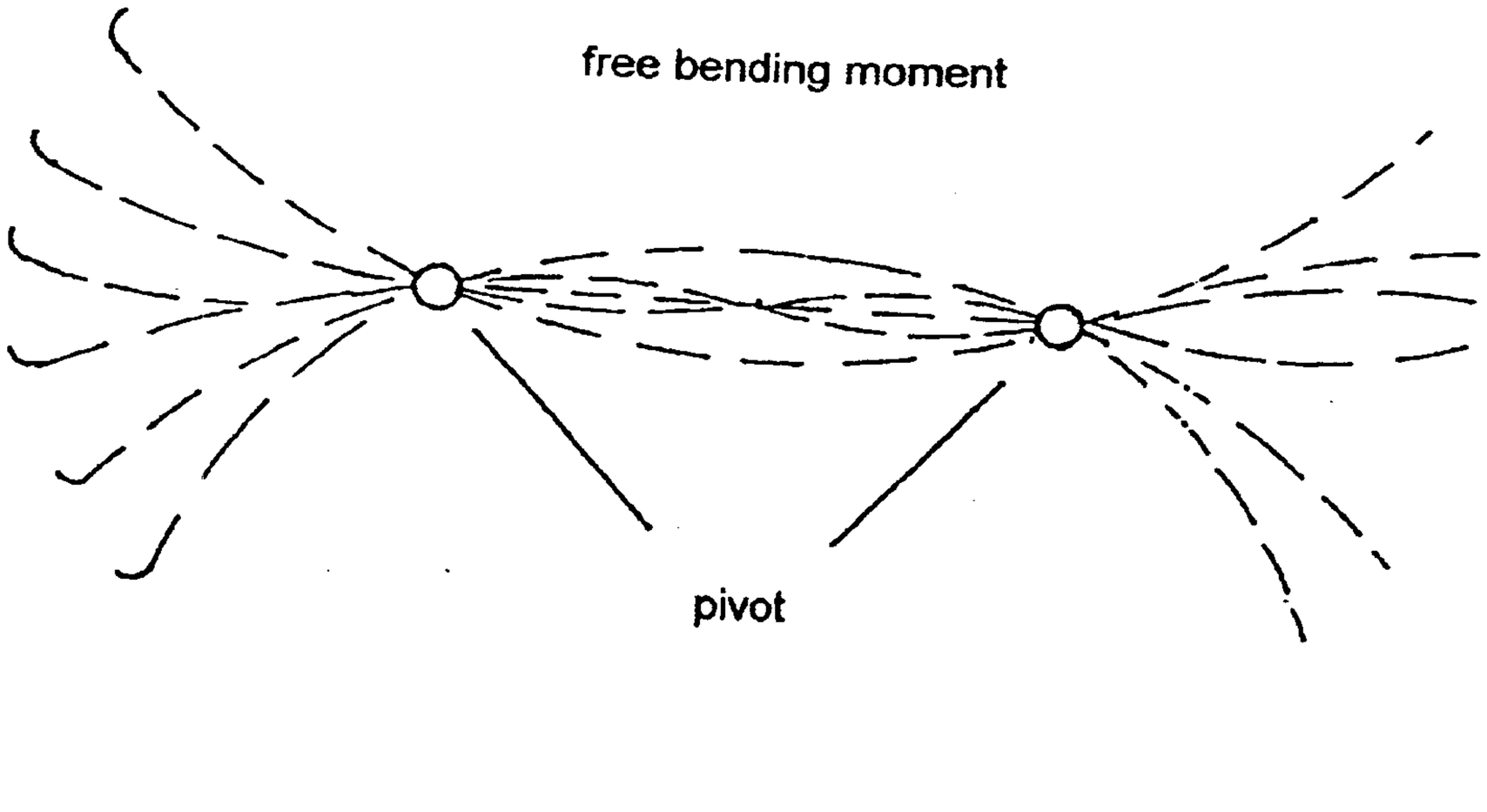
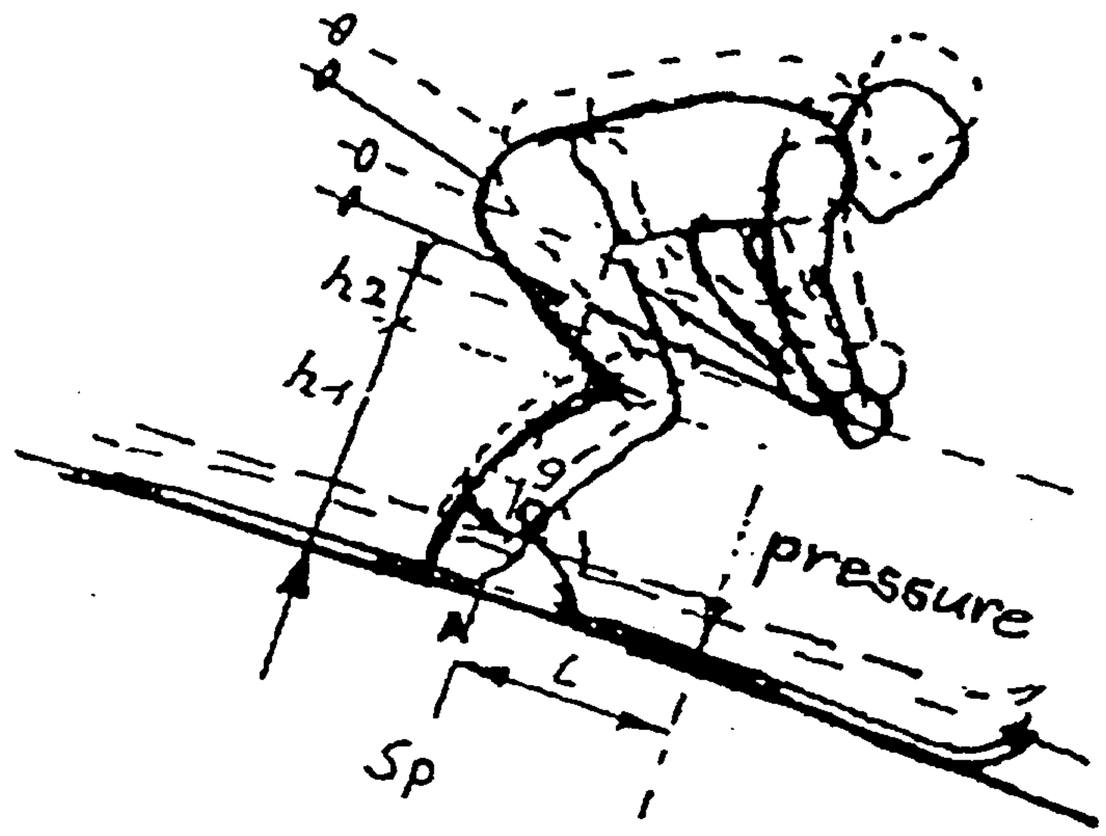


FIG. 4

Height adjustment

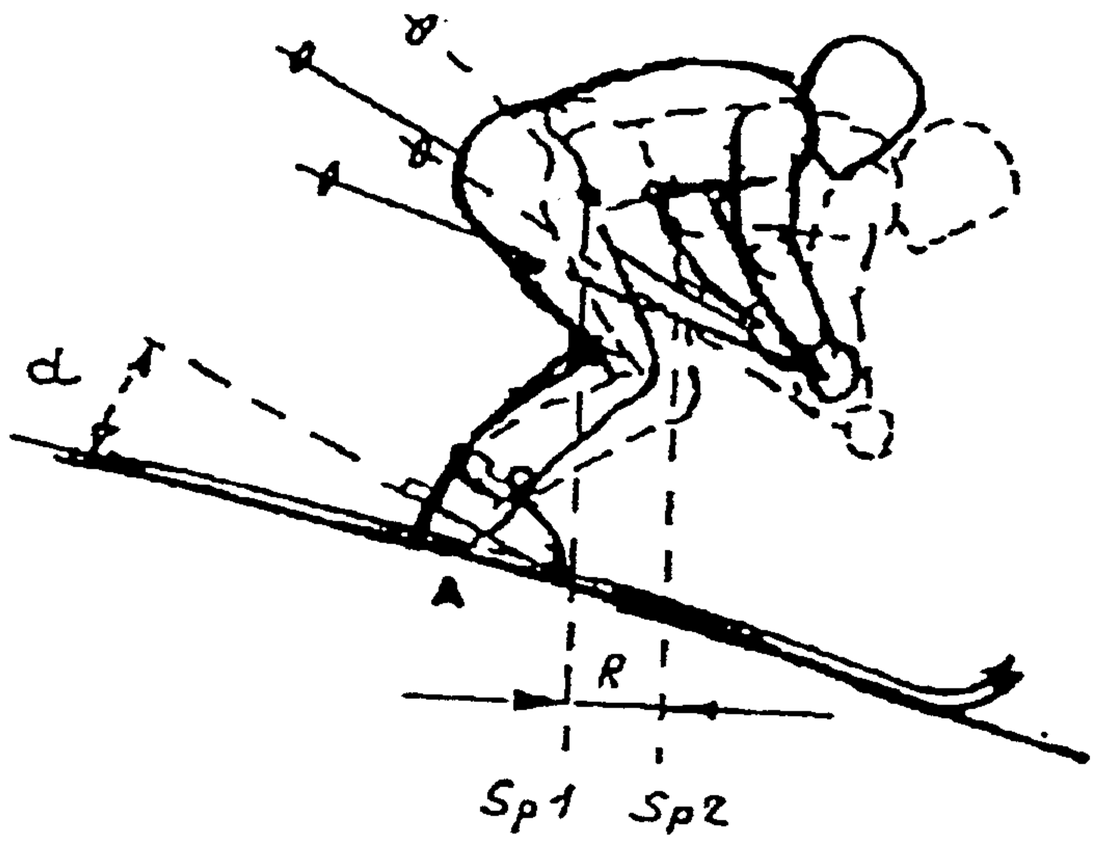



h1 = normal height without Snow-Speed
h2 = additional height by way of Snow-Speed
Sp = centre of gravity/weight
L = length

Lever principle: h1 + h2 × weight = length × pressure

FIG. 5

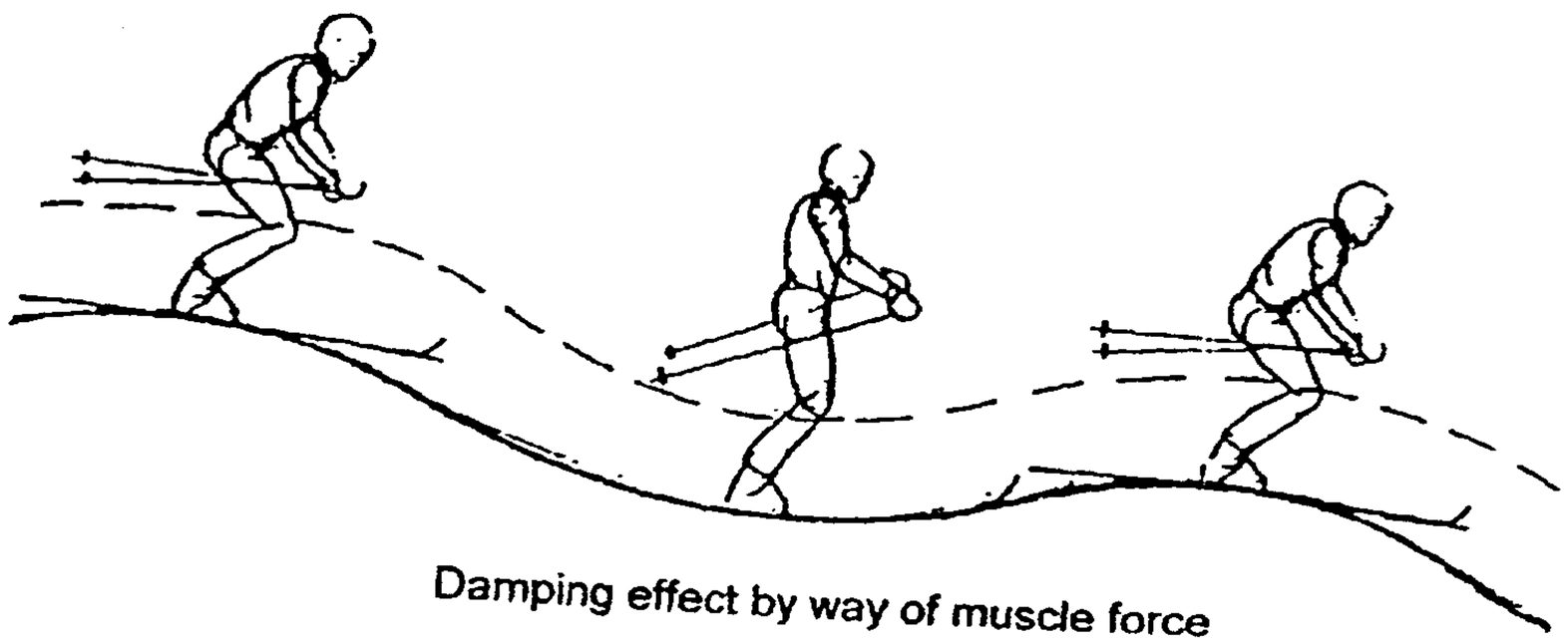
Inclination angle adjustment



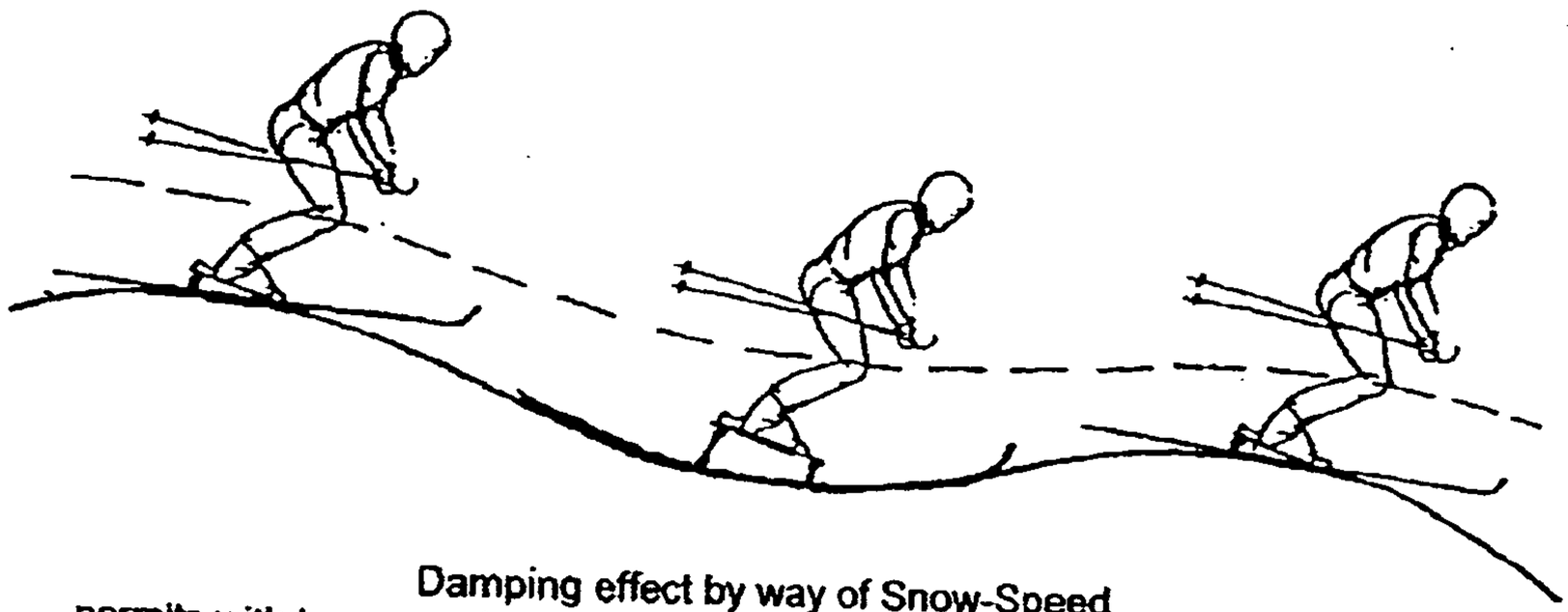

@ = inclination angle up to approx. 20 degrees forward
Sp1 = centre of gravity without inclination angle
Sp2 = centre of gravity with inclination angle
R = resulting pressure displacement

FIG. 6

Damping system



Damping effect by way of muscle force



Damping effect by way of Snow-Speed
permits with less muscle effort a more favourable path of the centre of gravity

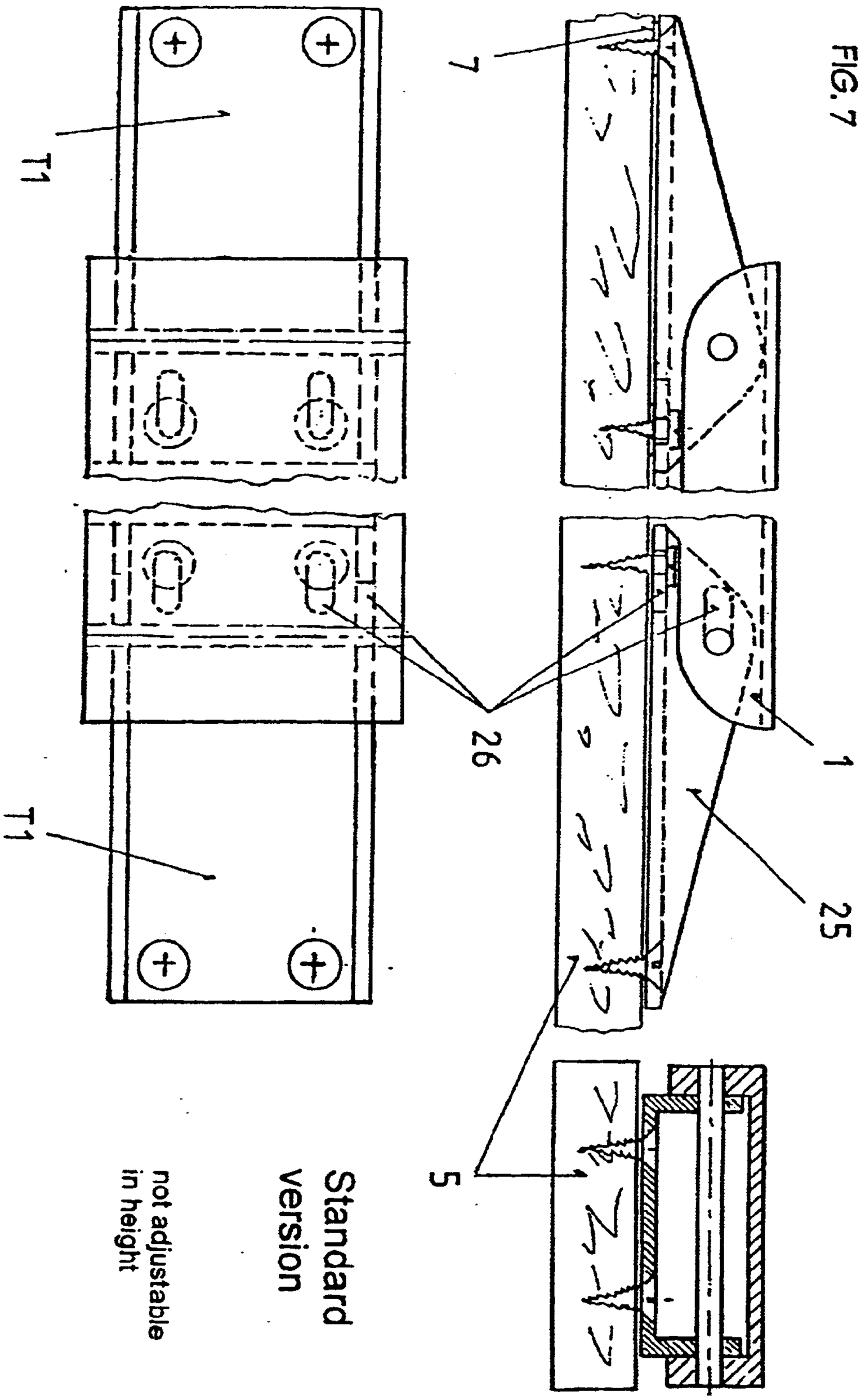



FIG. 7

Standard version

not adjustable in height

FIG. 6

Standard version with rollers

not adjustable in height

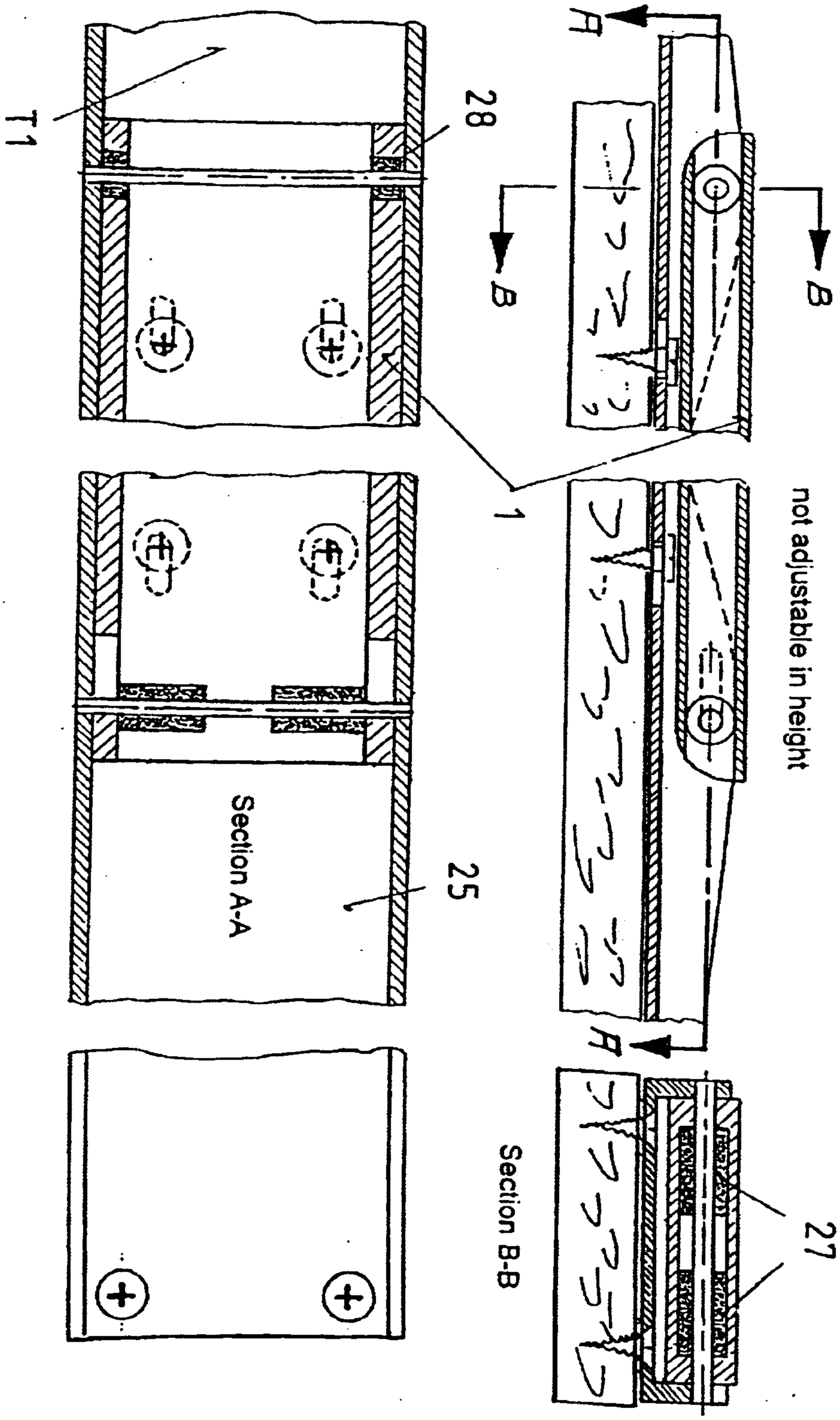
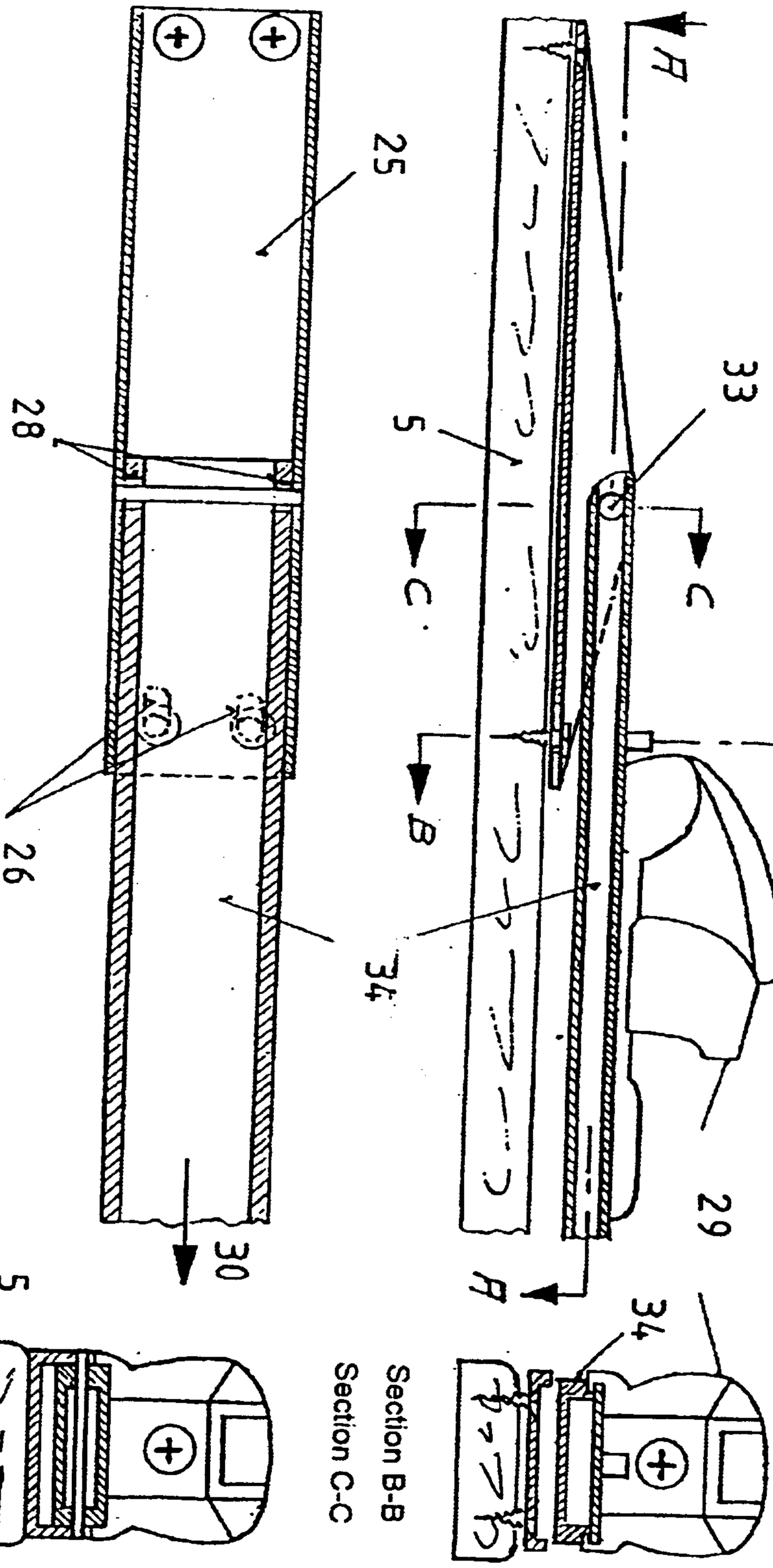


FIG.9

Standard embodiment with rollers

directly integrated in the ski binding



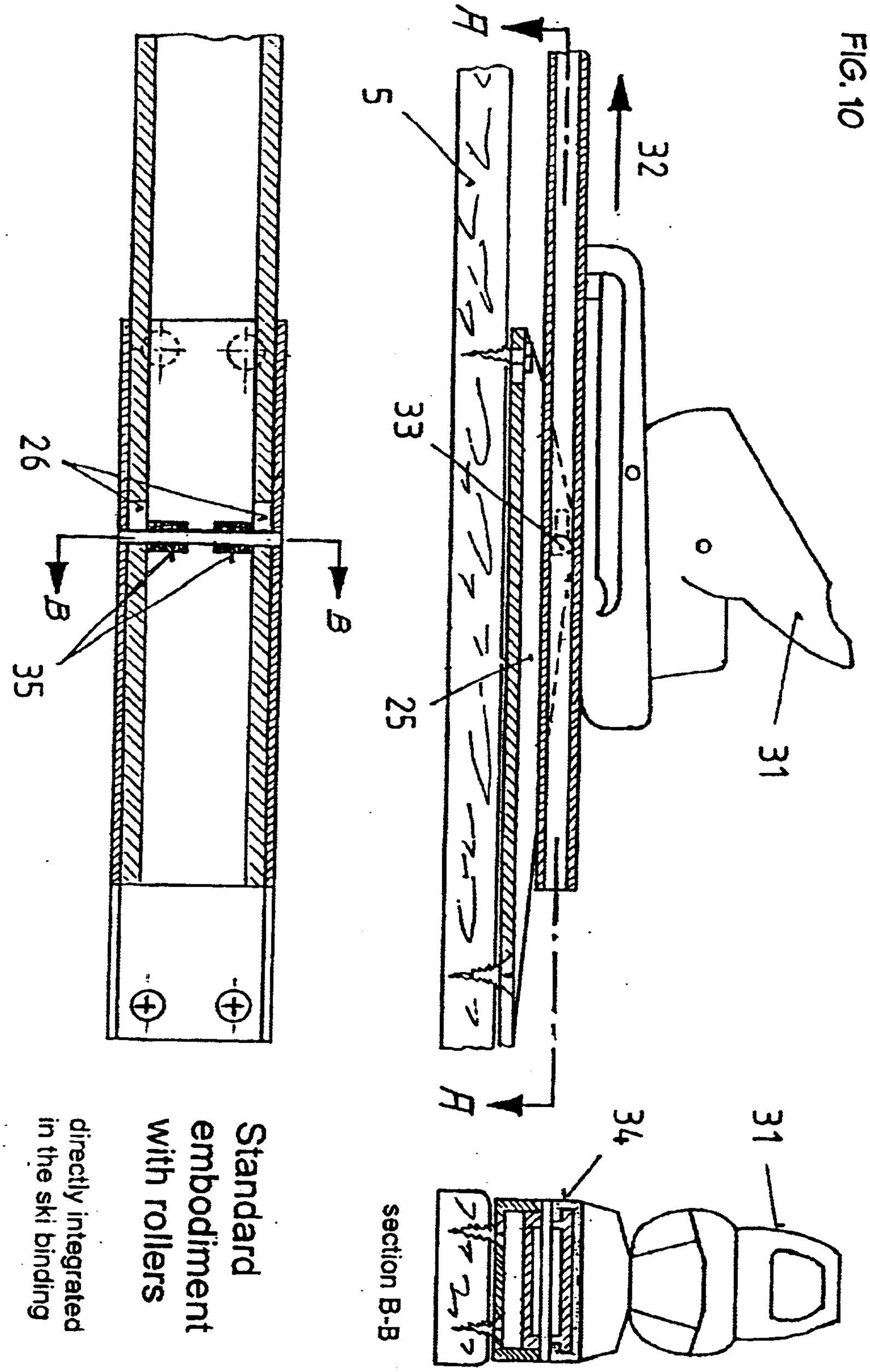



FIG. 10

Standard embodiment with rollers

directly integrated in the ski binding

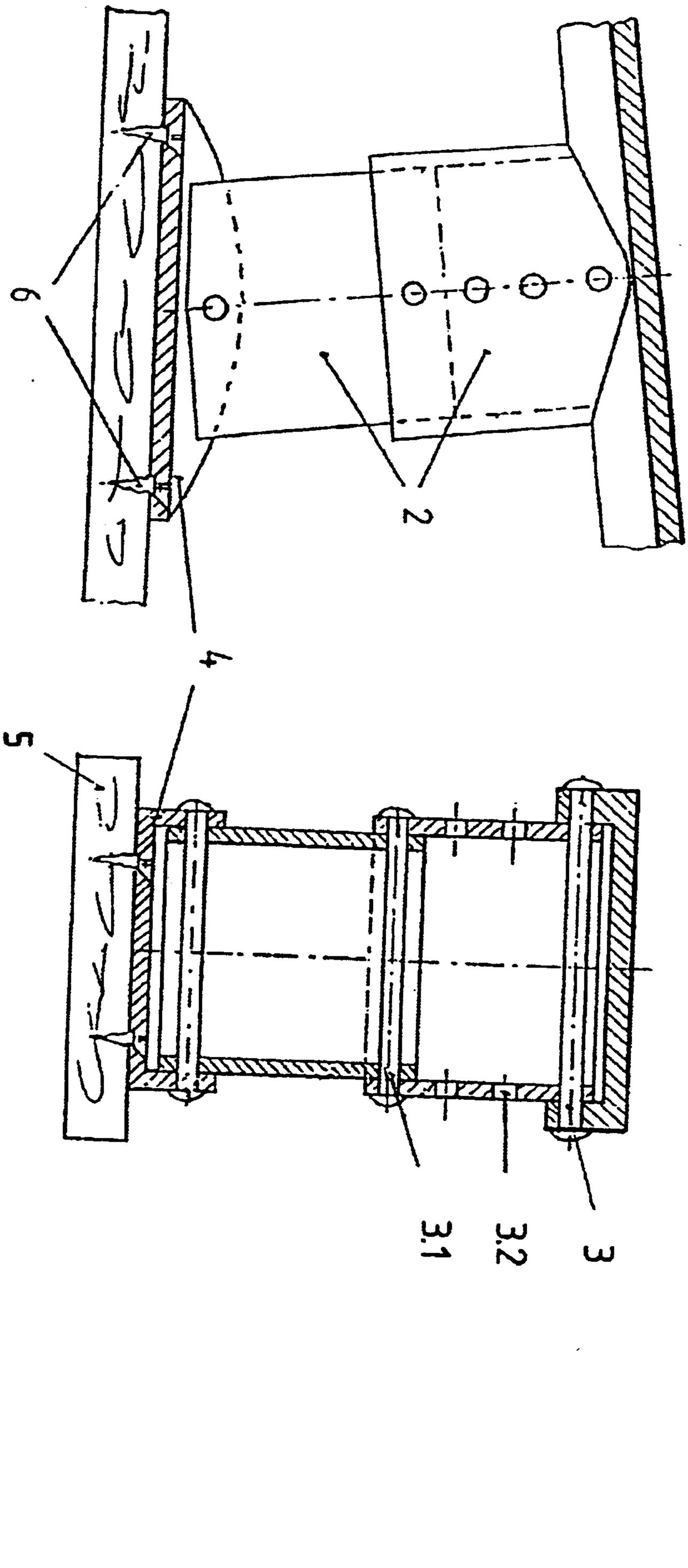



FIG. 11

Height adjustment with bolts

Rear fastening

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FIG. 12

Height adjustment with thread

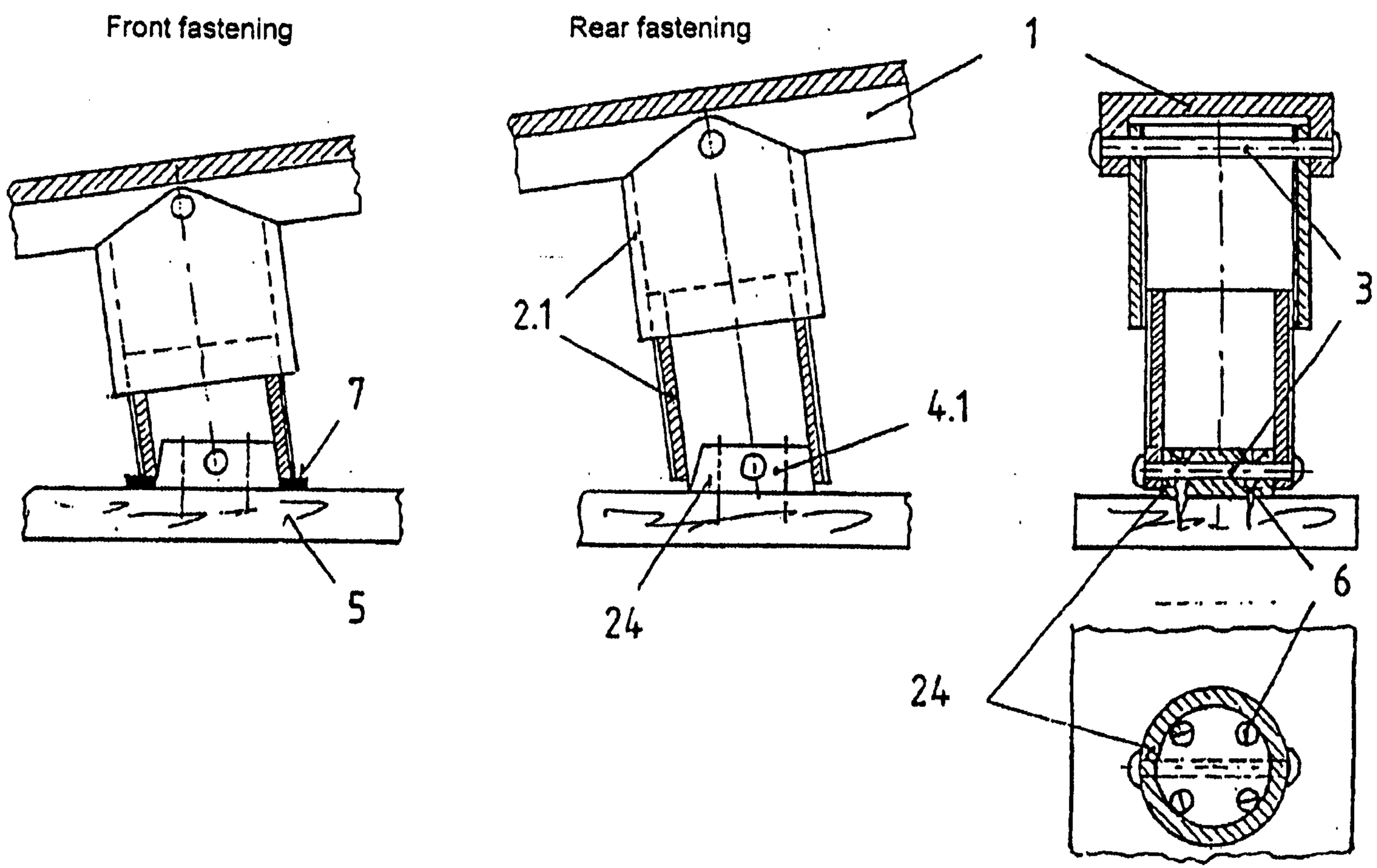

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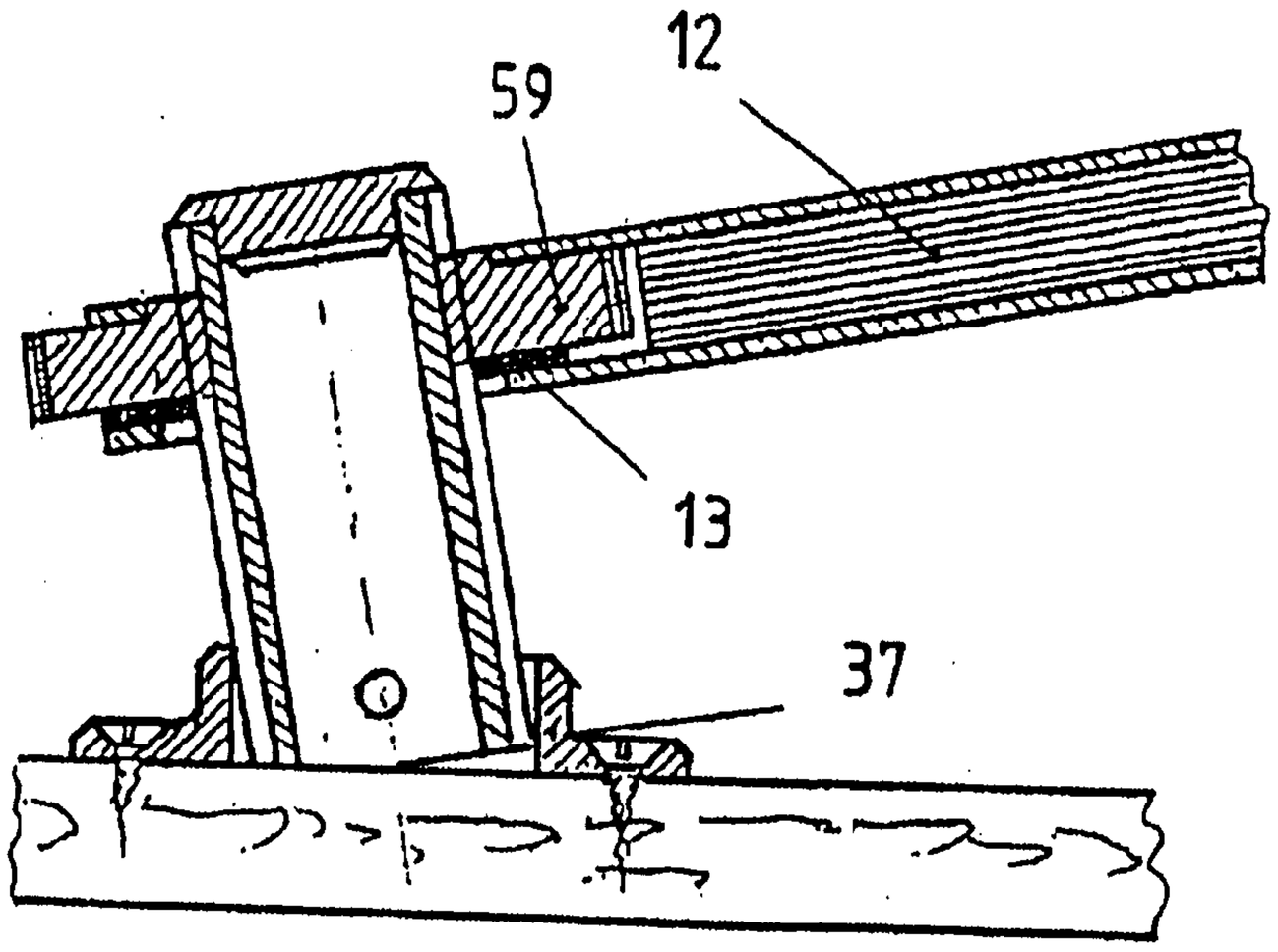
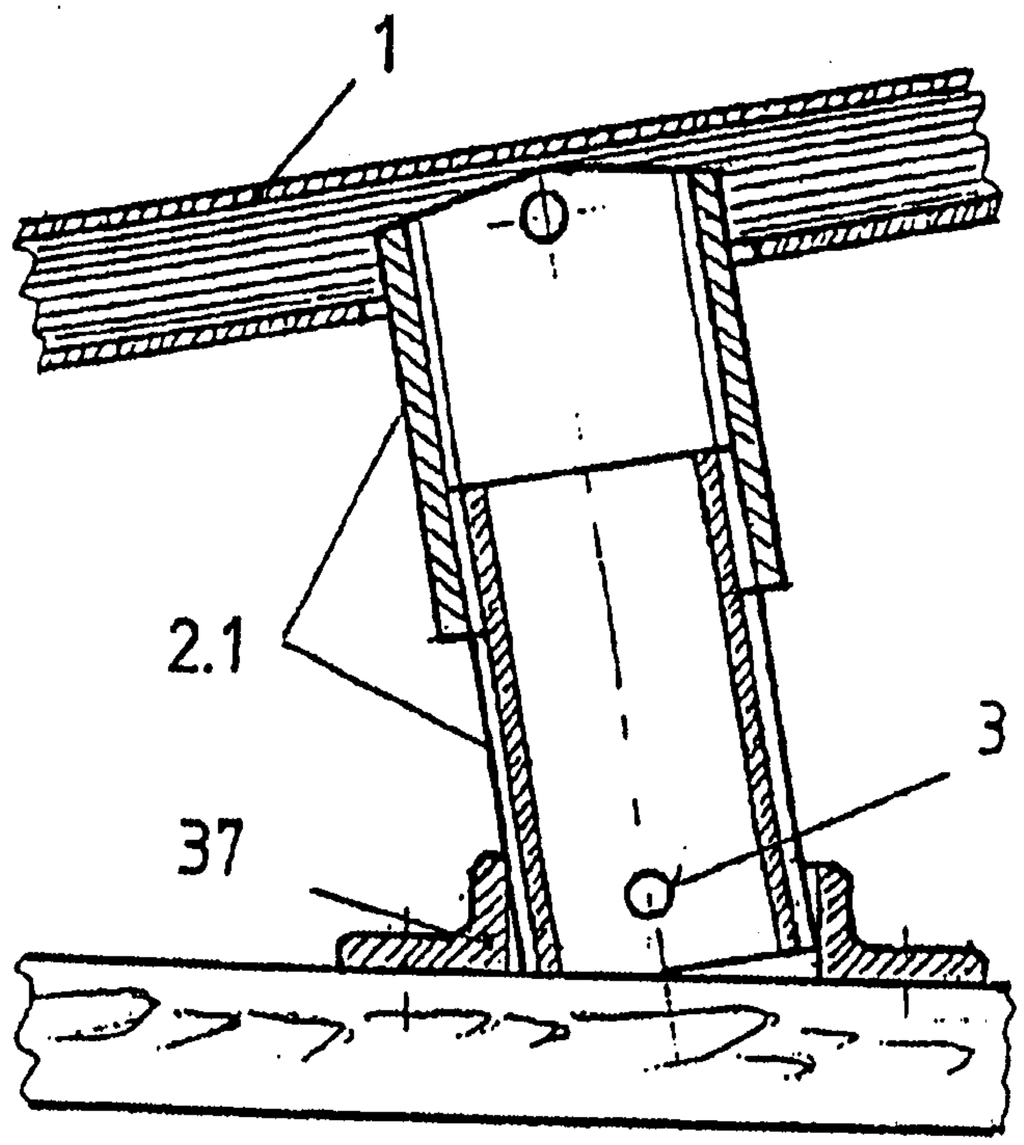
FIG. 13

Height adjustment by way of thread




Front




Rear

FIG. 14

Height adjustment with thread
(by way of rotation knob)

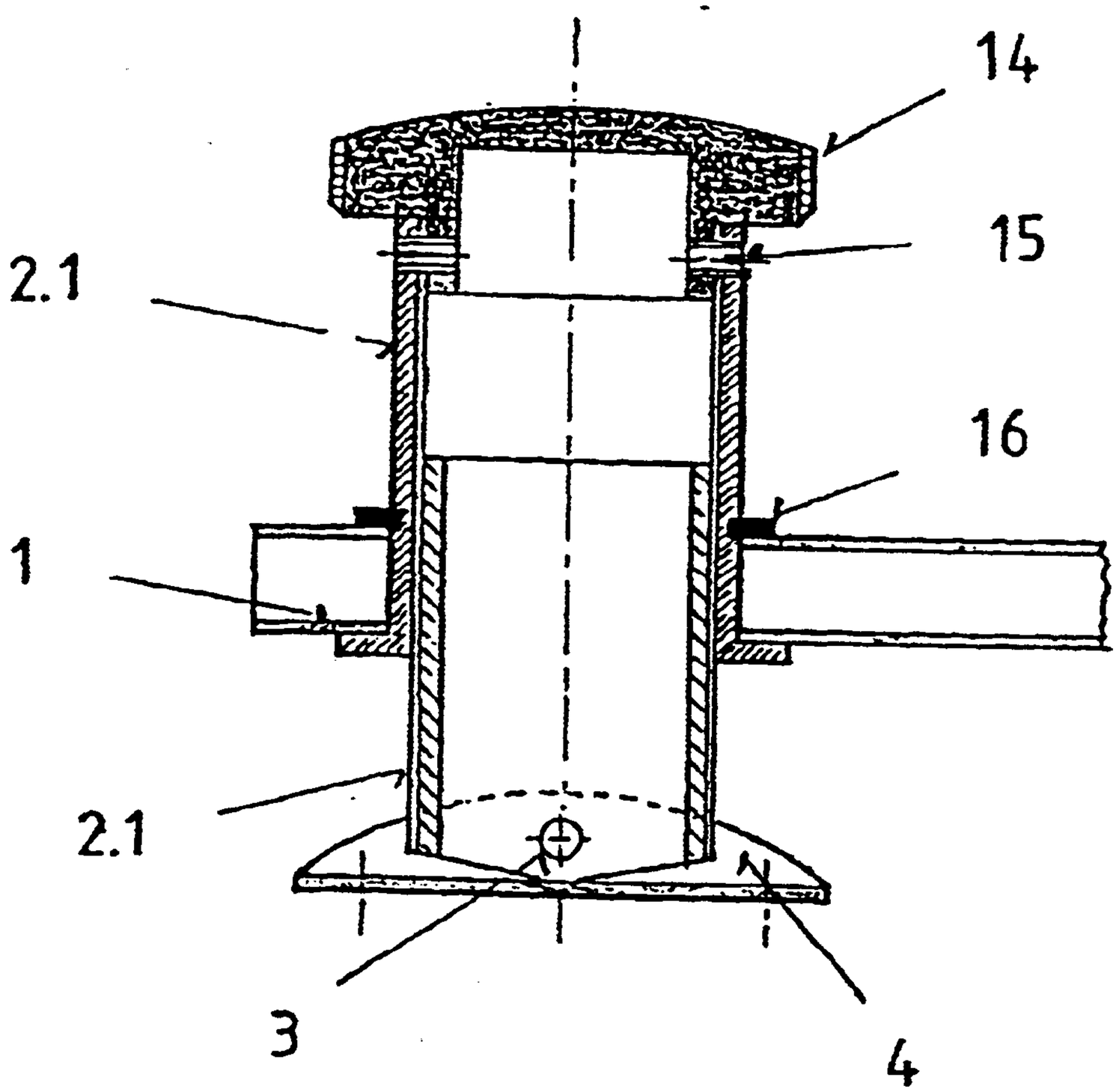
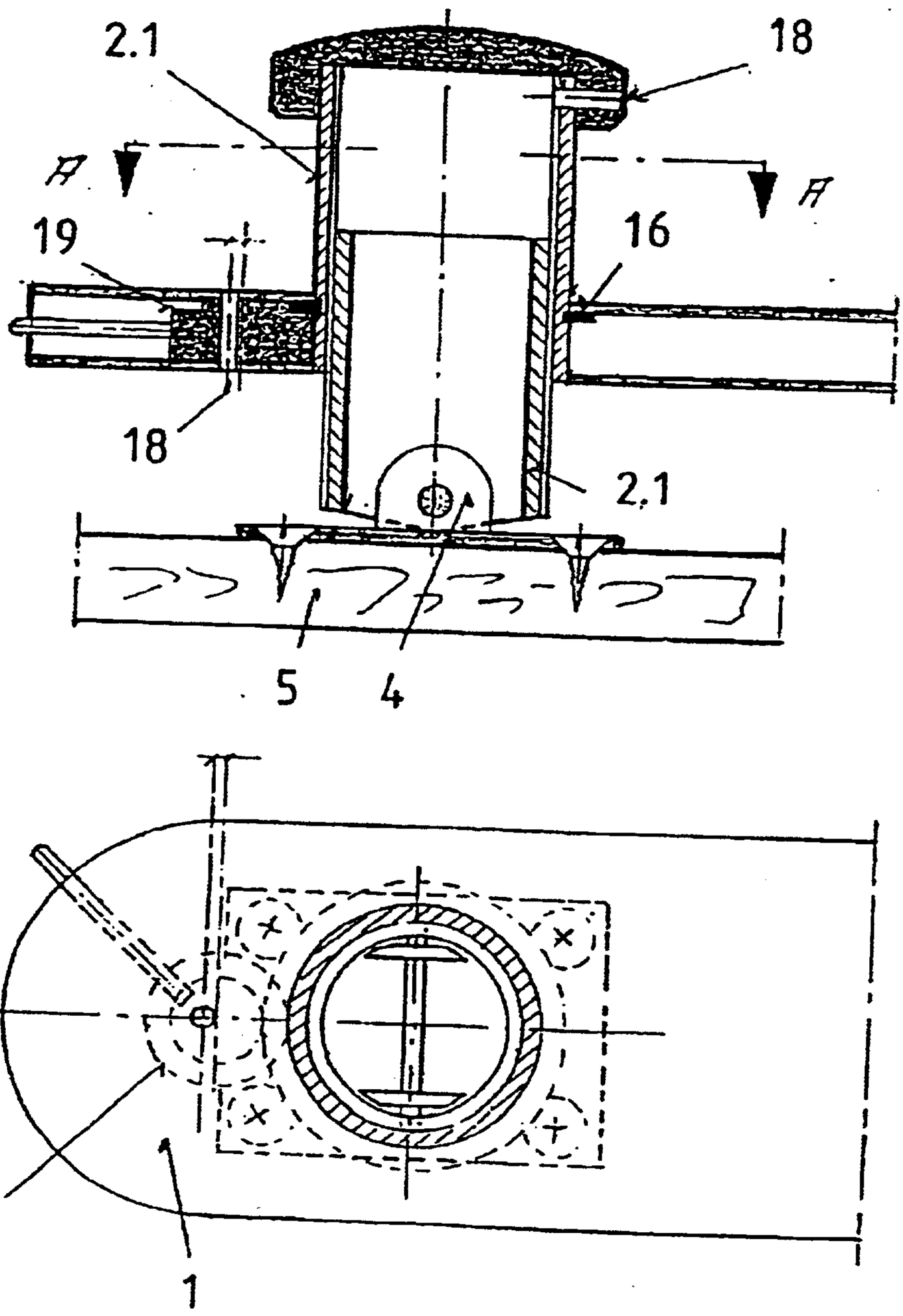


FIG. 15

Height adjustment with thread
by way of rotation knob




Section A-A

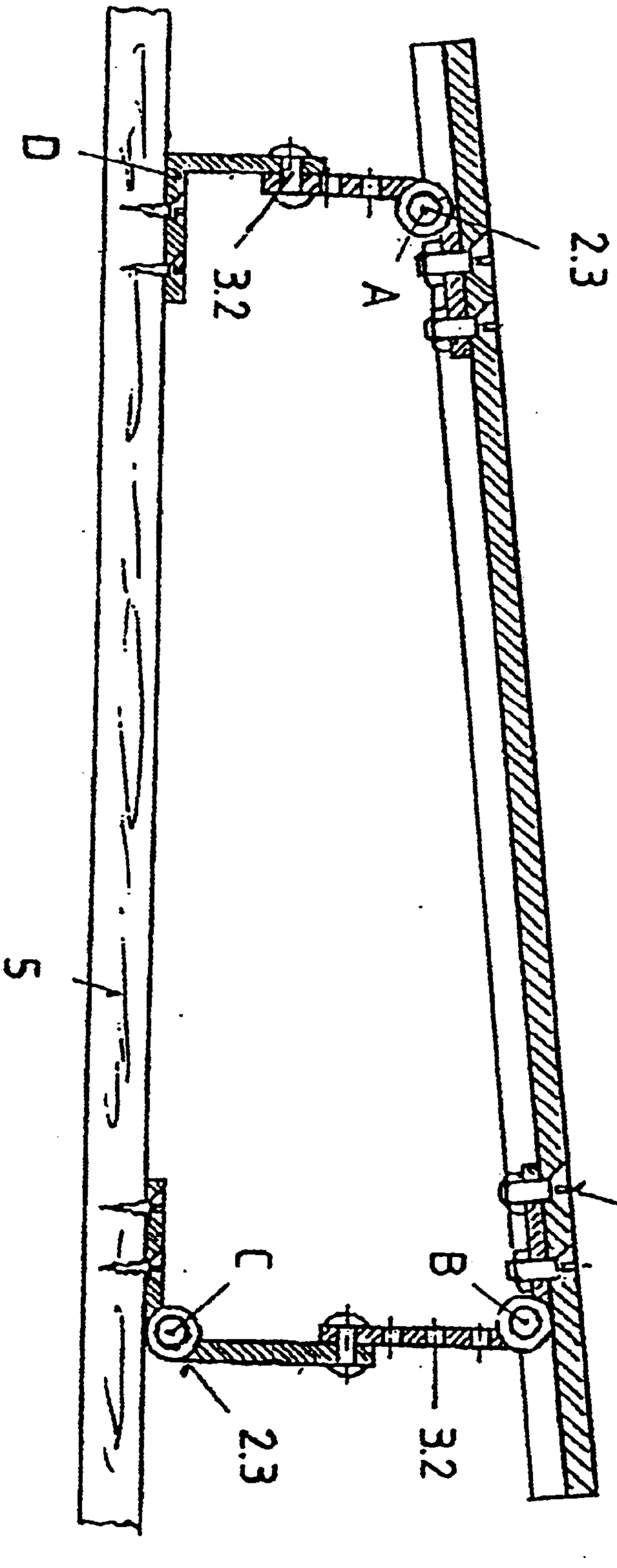



FIG. 16

Height adjustment by way of hinges

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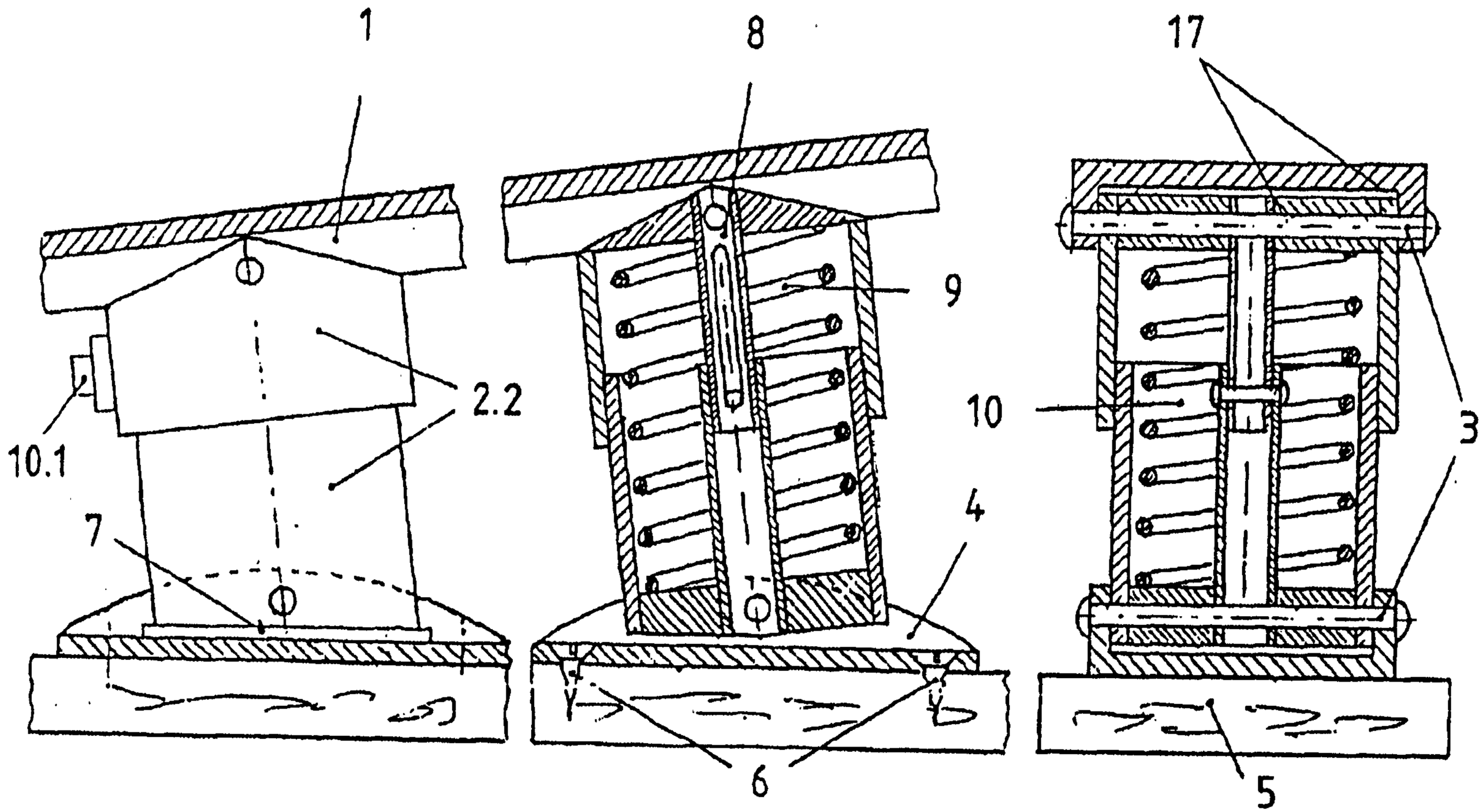
FIG. 17 Damping effect by way of spring and air cylinder




Front spring system

Rear spring system

Lateral view

FIG. 18

Damping effect by way of leg springs and hinges or compression springs

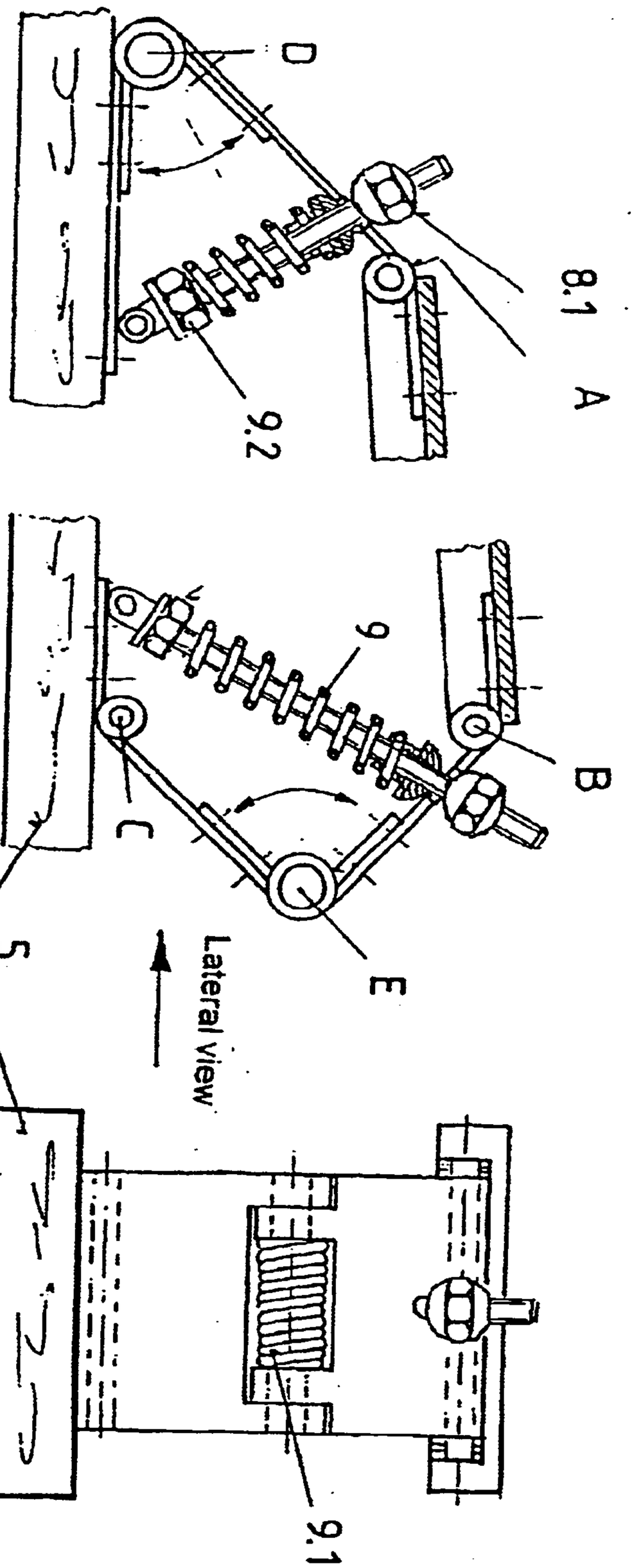


FIG. 19

Damping effect by way of
compression springs and air cylinder

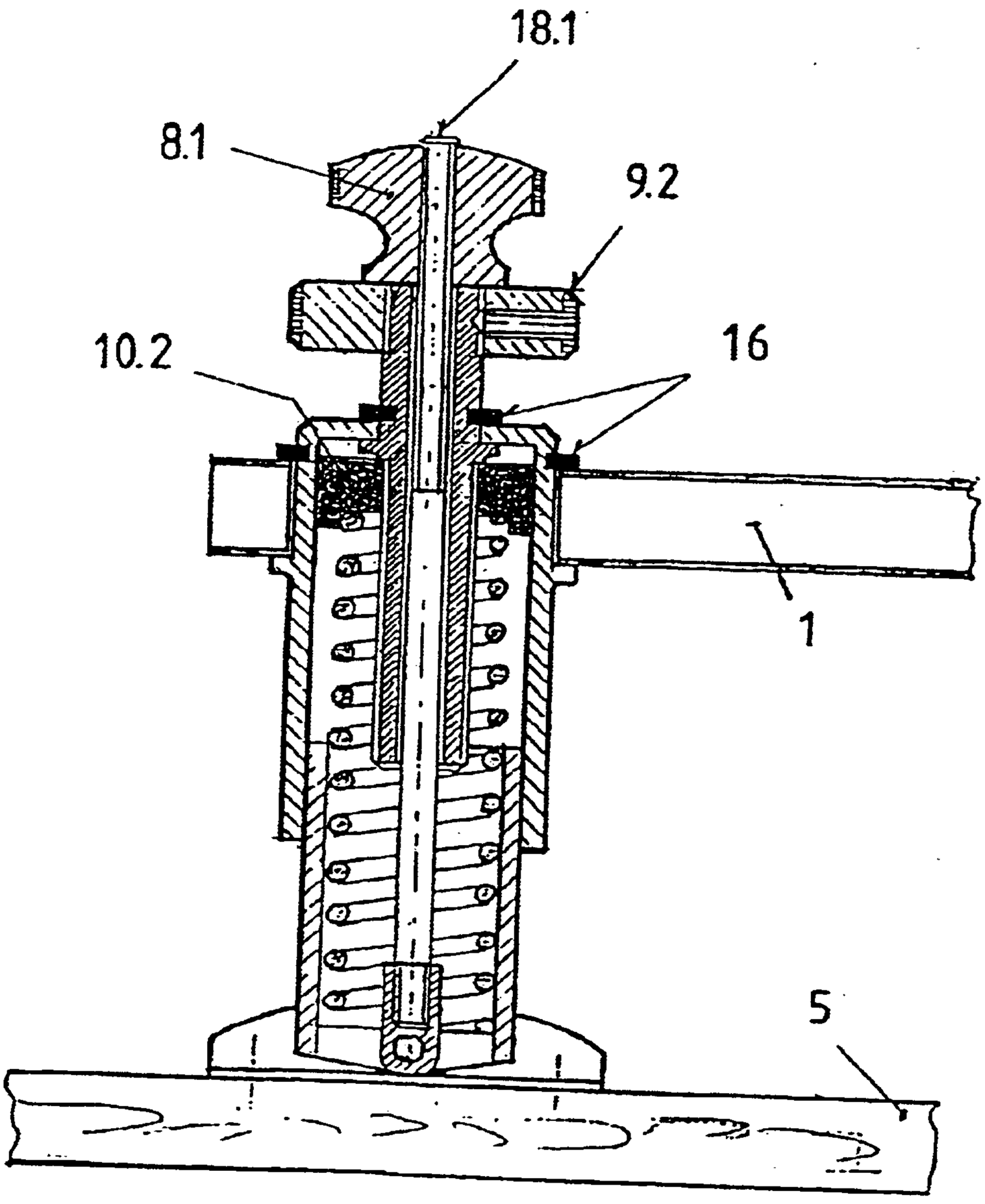
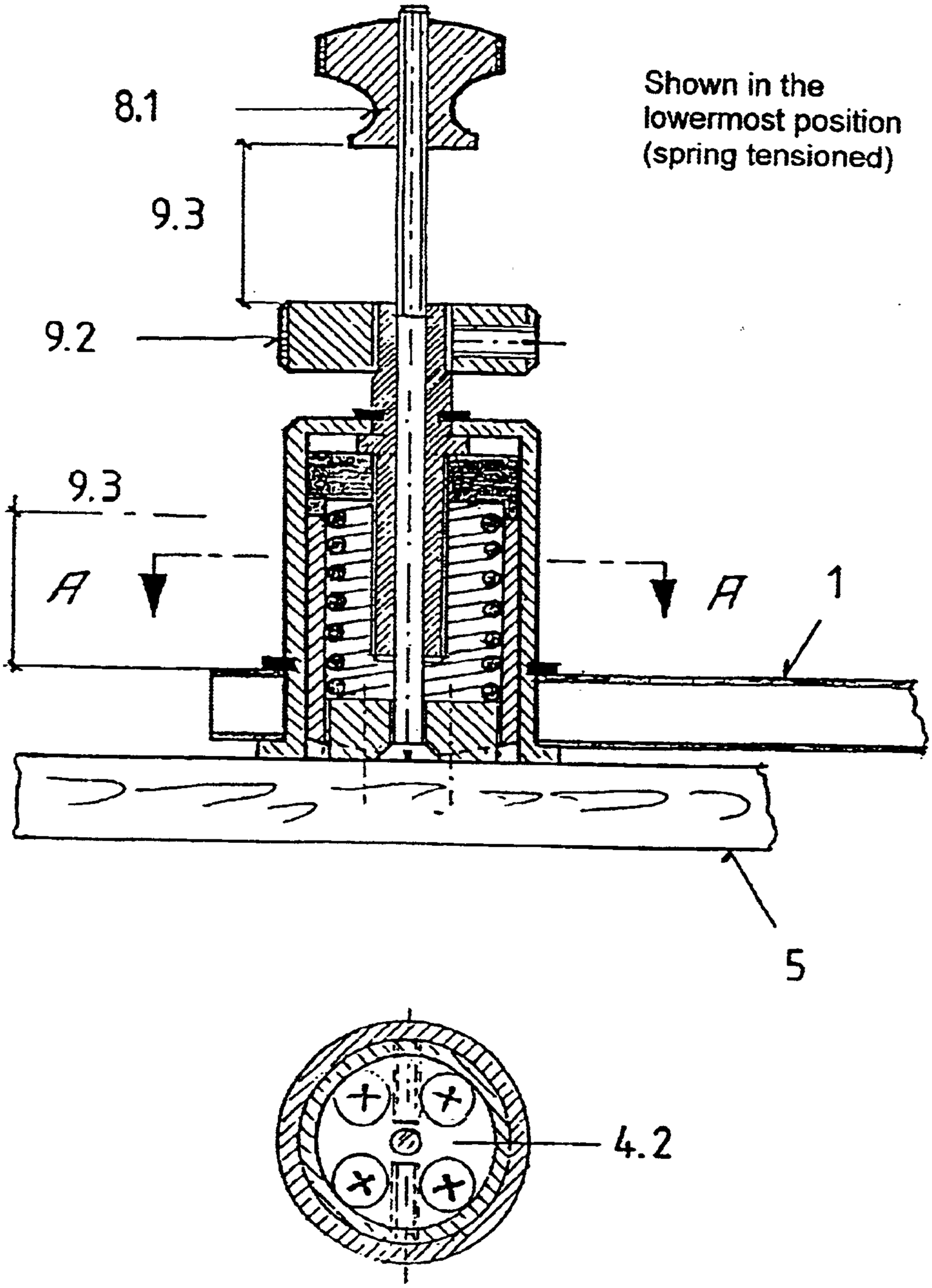


FIG. 20




Section A-A

FIG. 21

Fastening on the ski with jacks

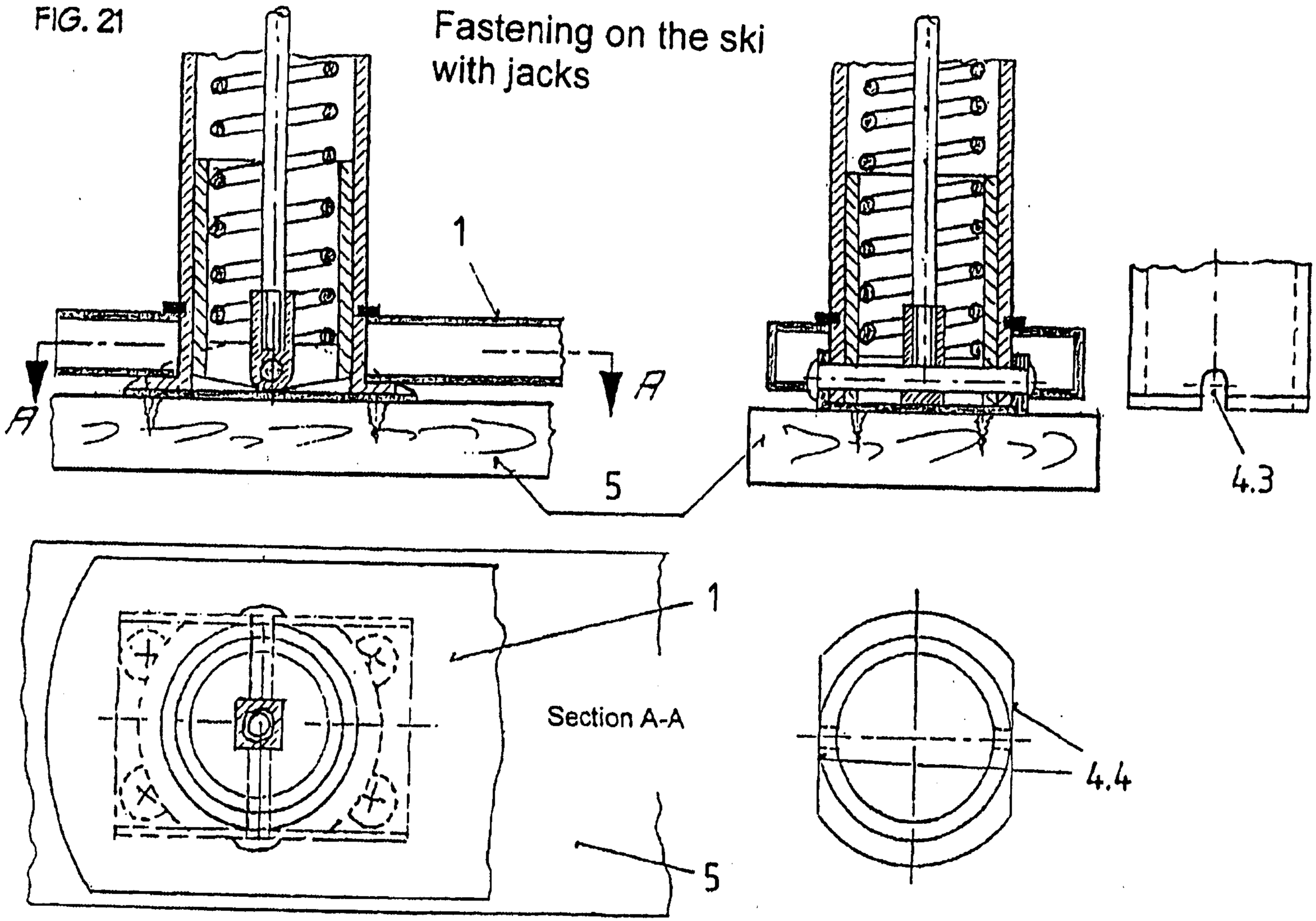



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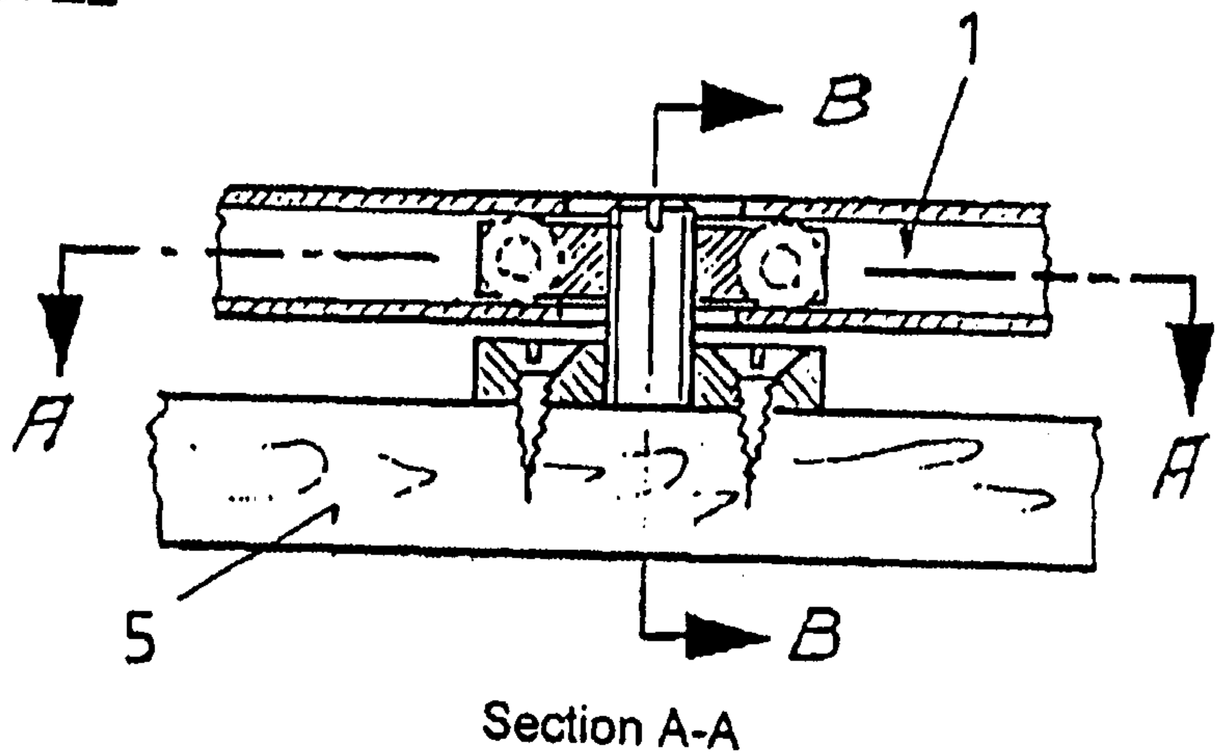
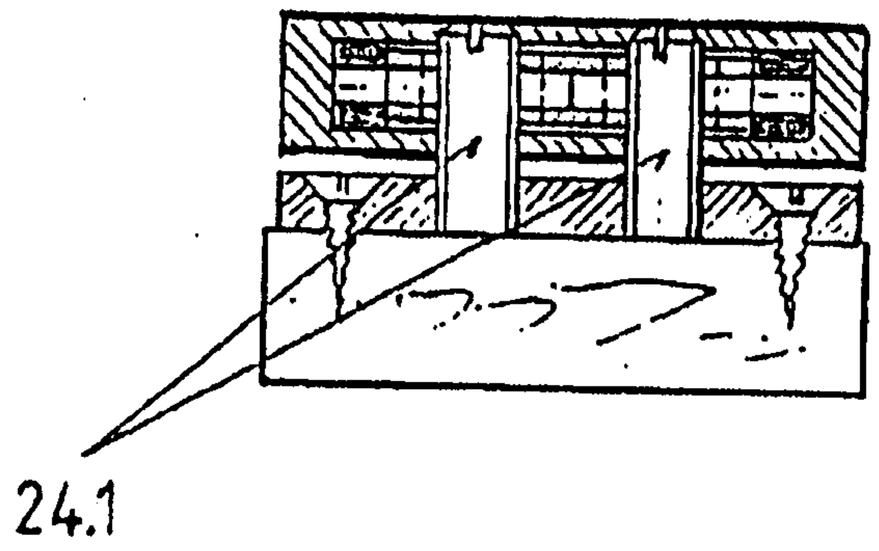
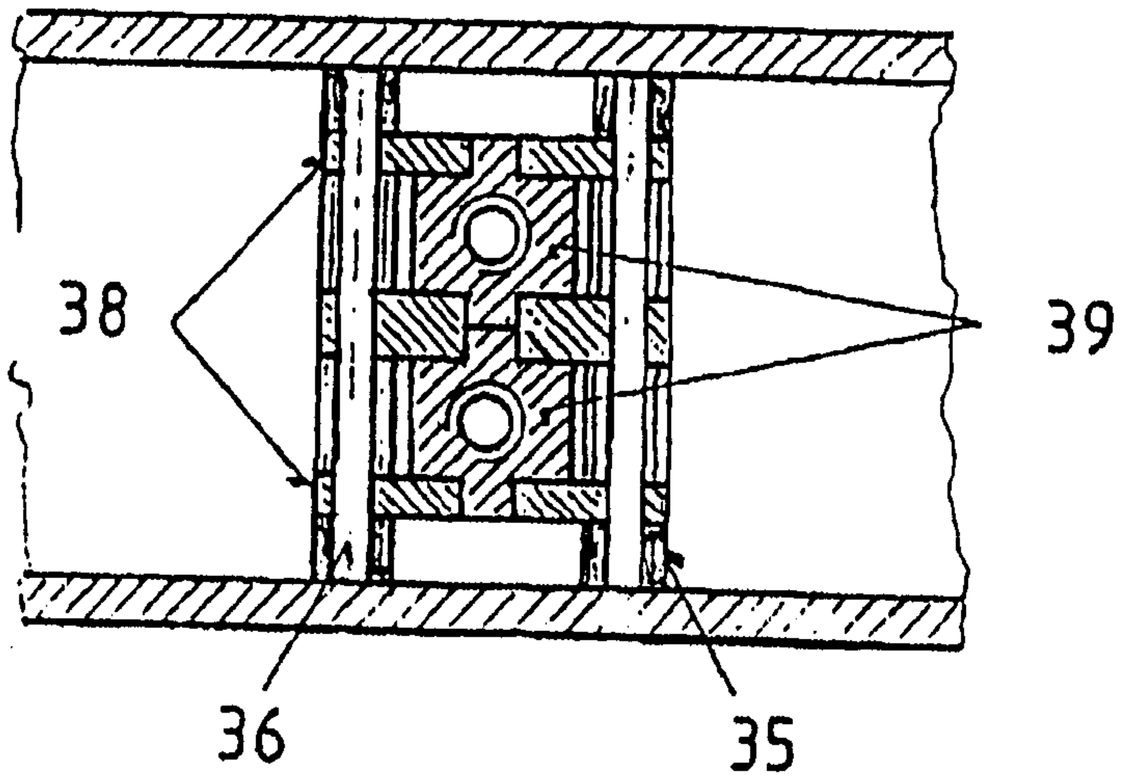
FIG. 22




Section A-A

Section B-B




Length compensation carriage
with steal screws

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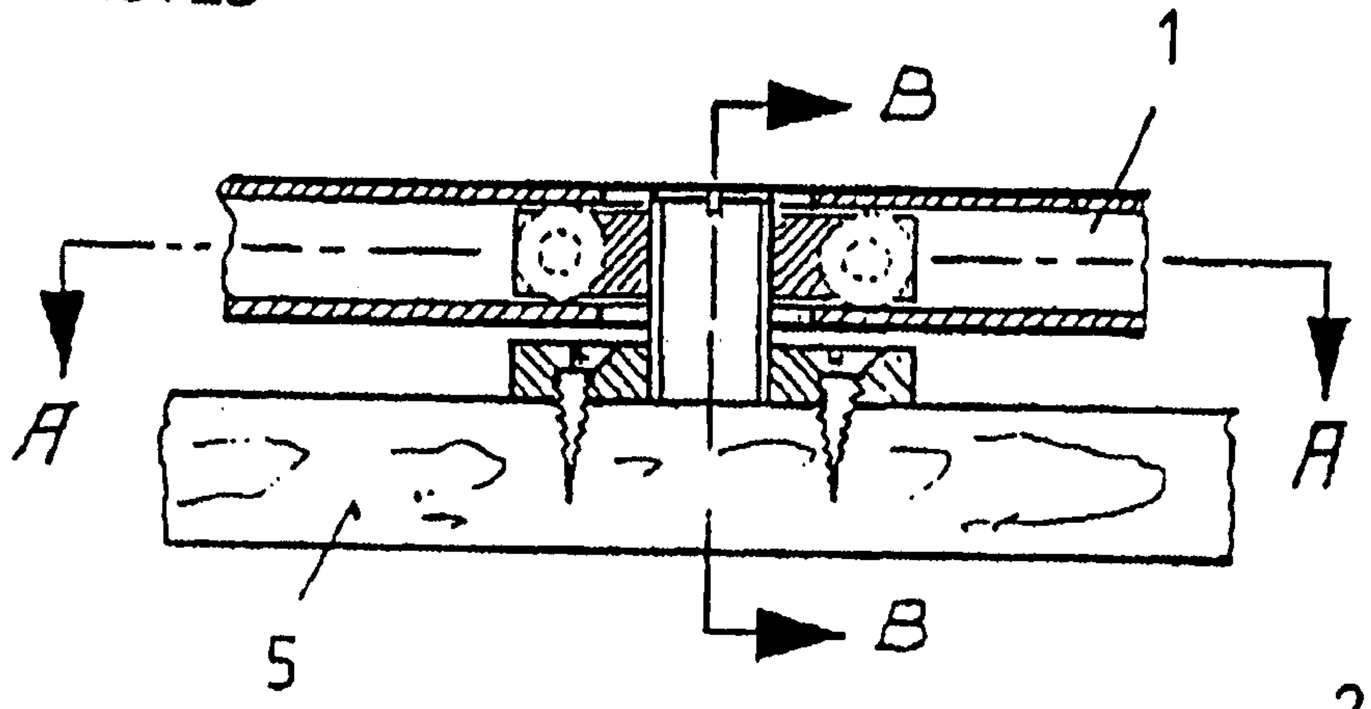
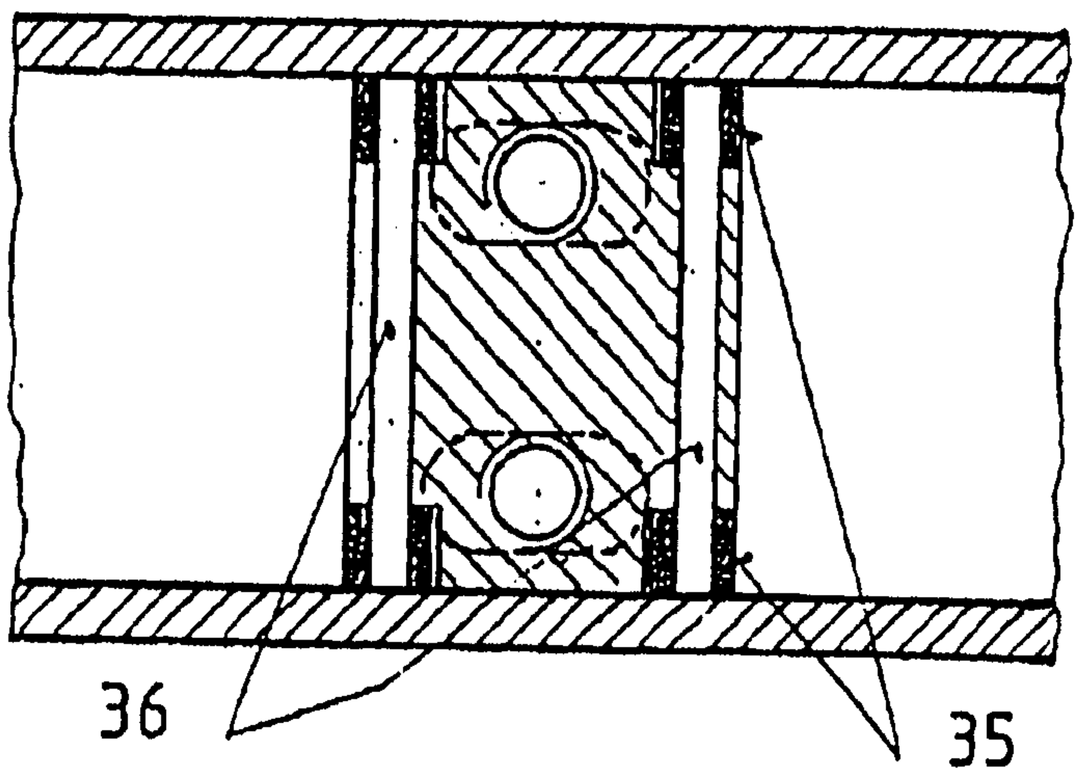
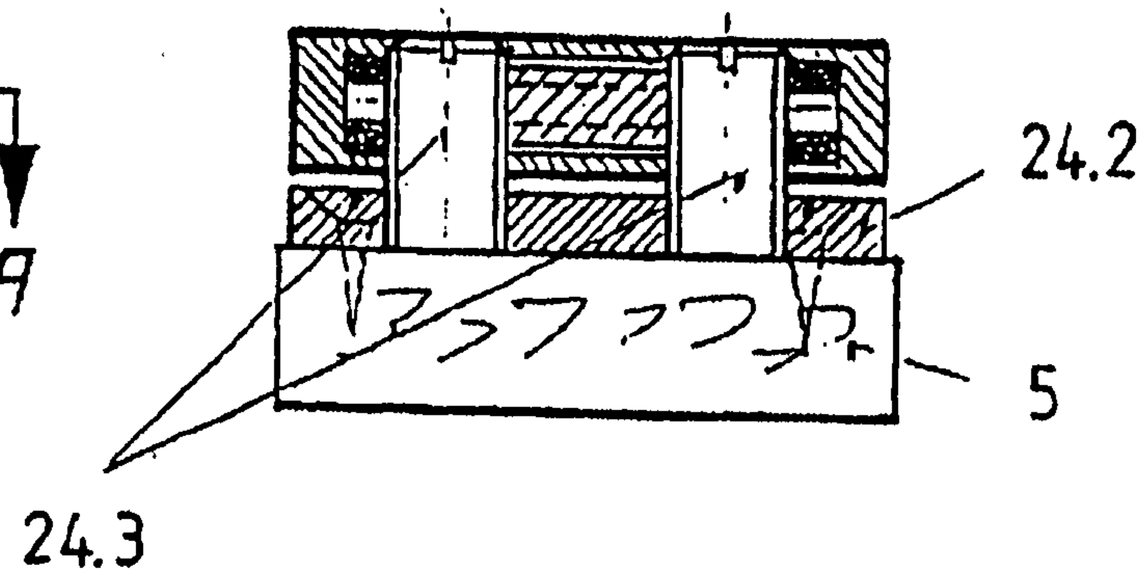
FIG. 23




Section A-A




Section B-B

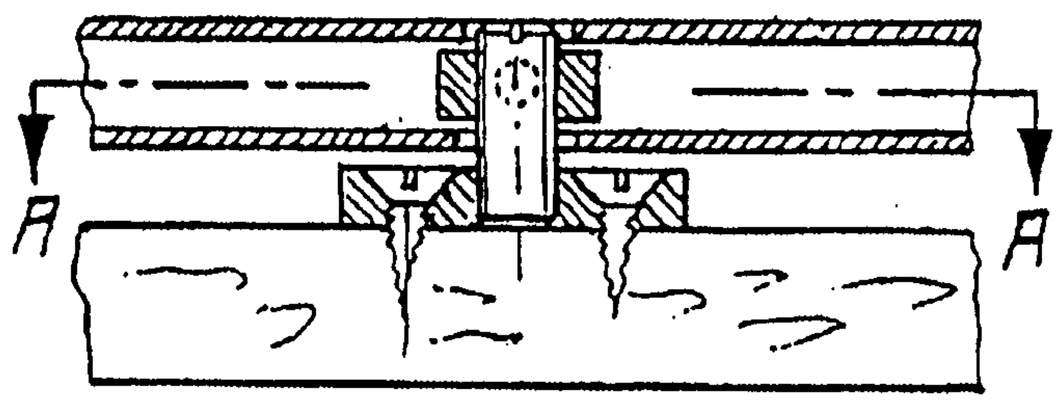



Length compensation carriage
with plastic screws

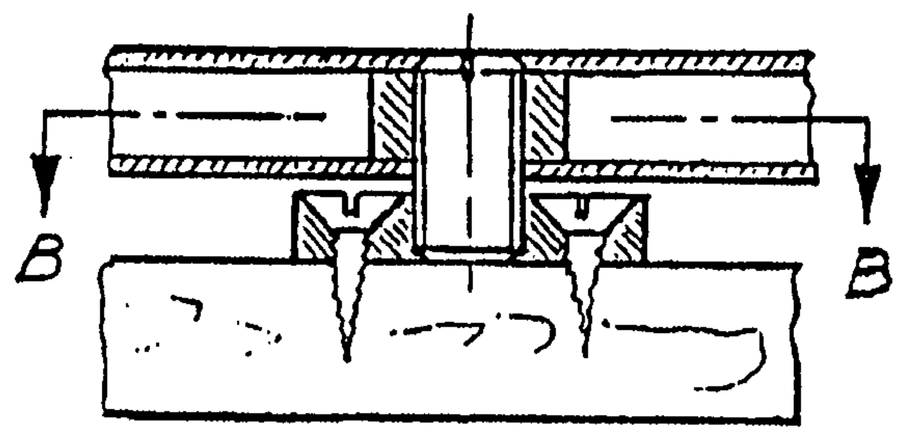
CA 02363023 2007-01-31

FIG. 24

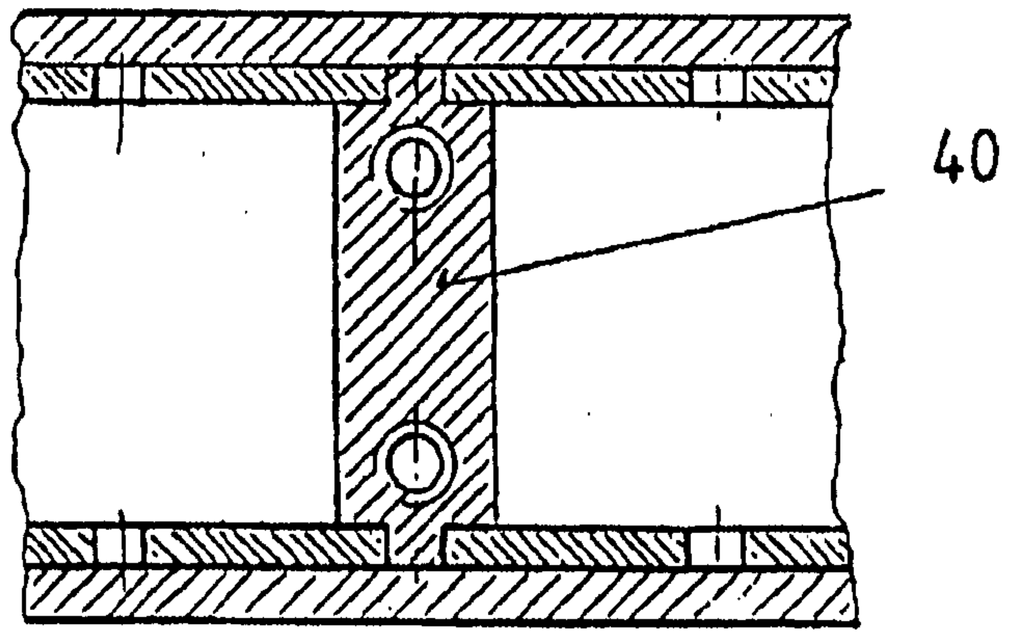
# Fastening on the ski



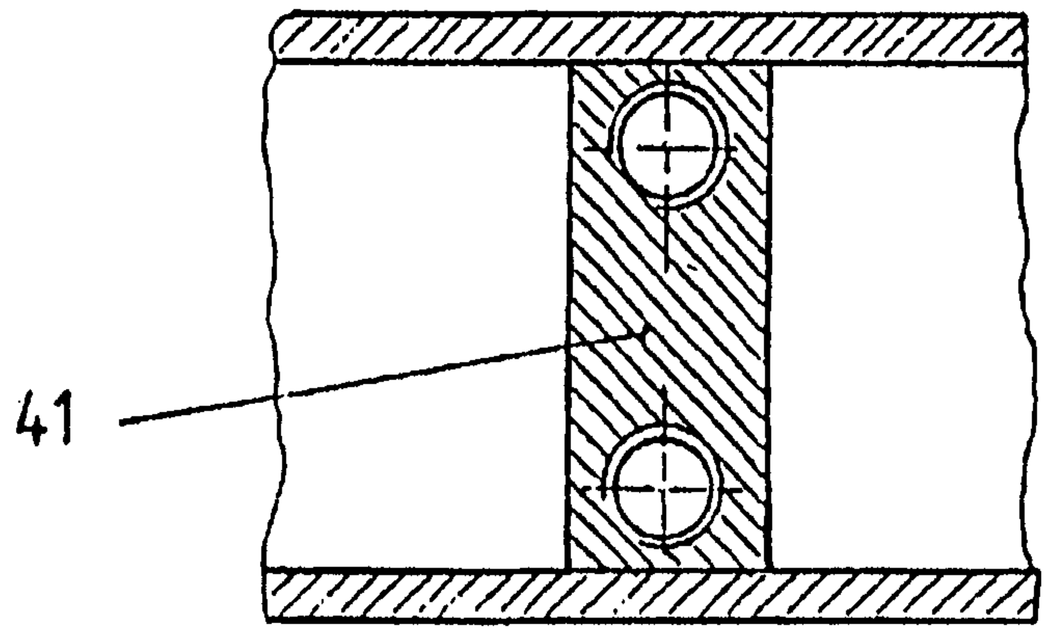

Section A-A



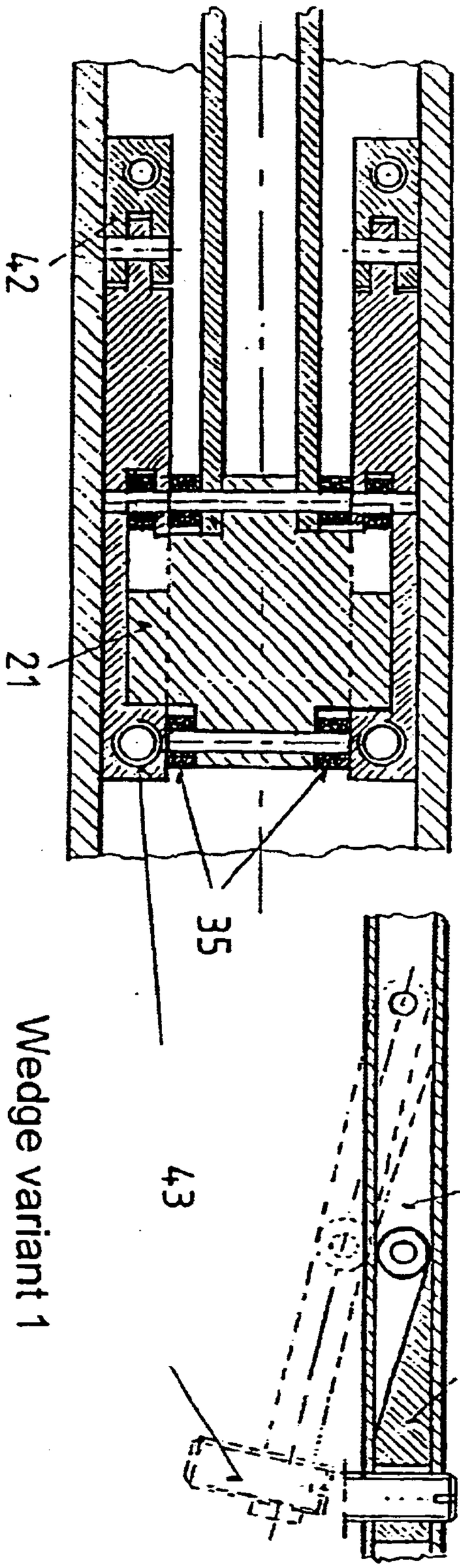

Section B-B




With steel screws




With plastic screws




Wedge variant 1

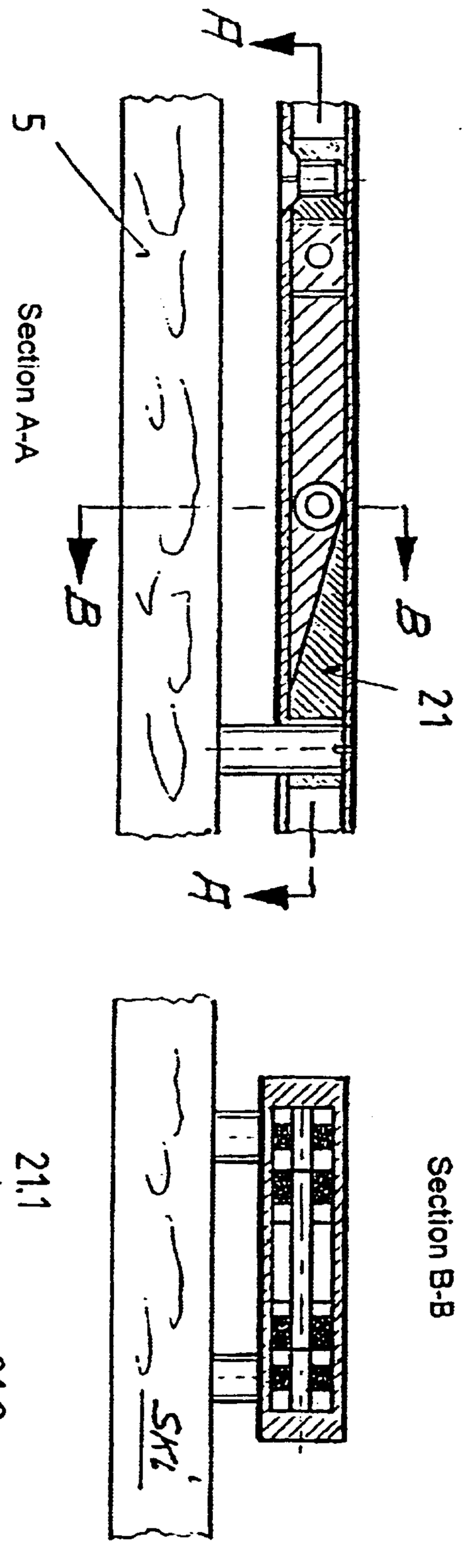
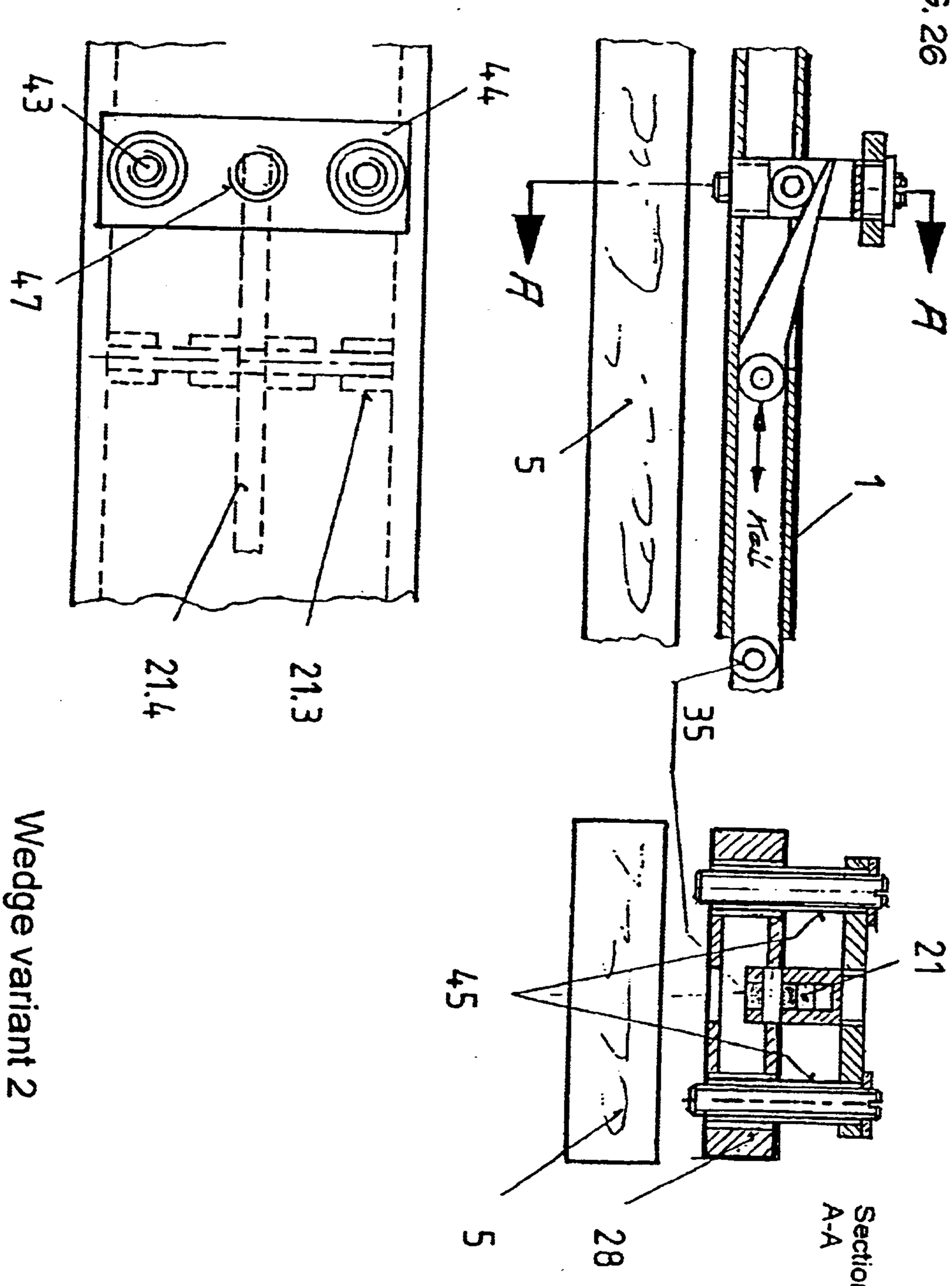



FIG. 25

FIG. 26




Wedge variant 2

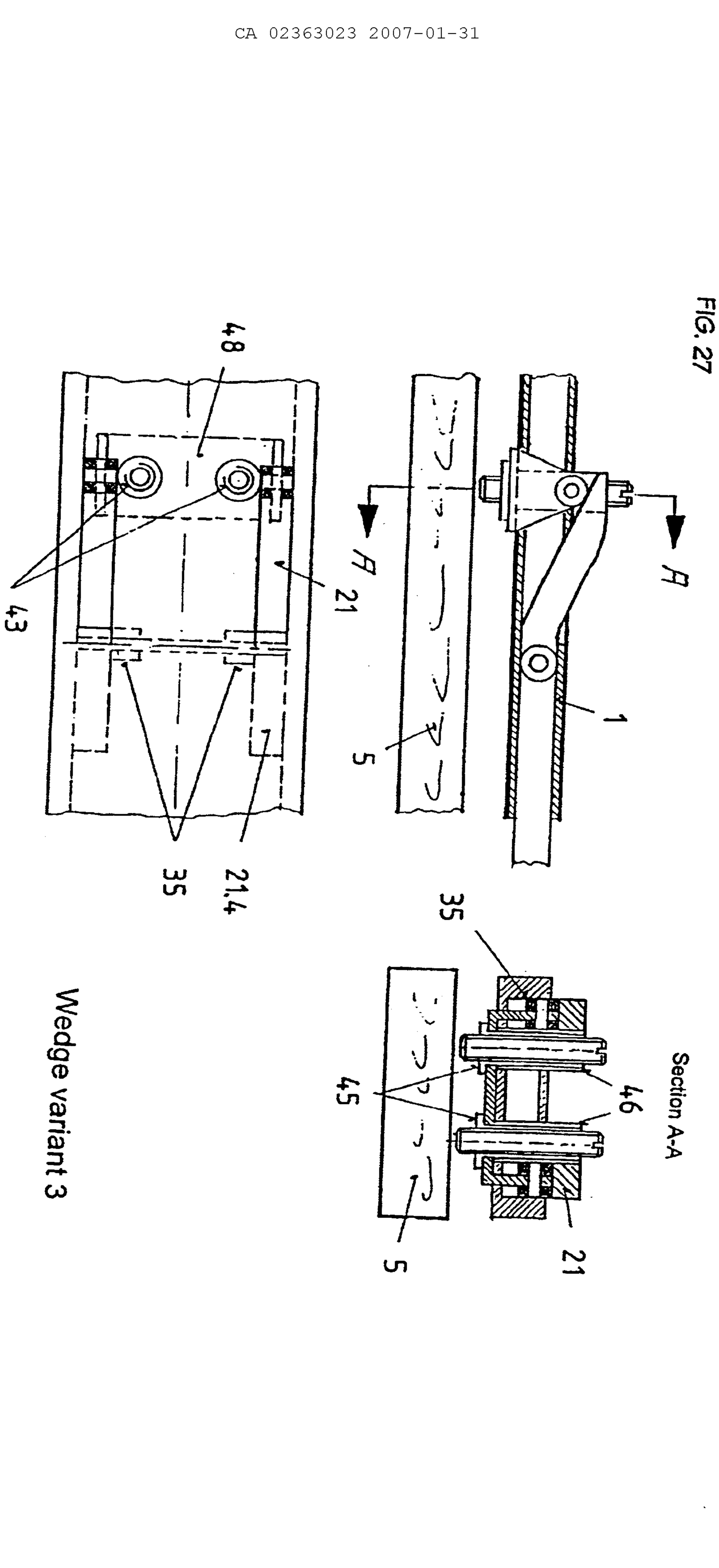



FIG. 2

Wedge variant 3

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FIG. 28

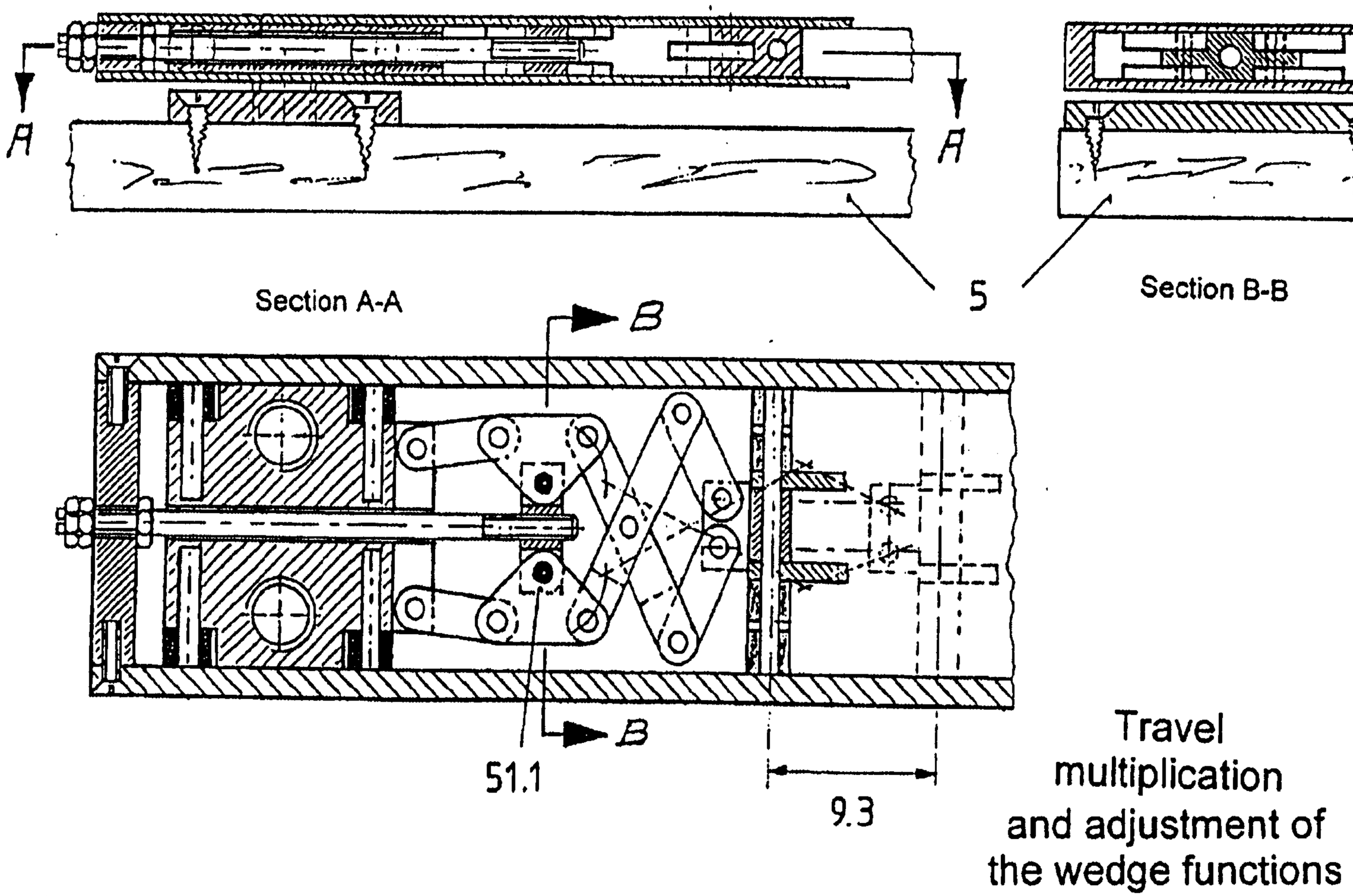
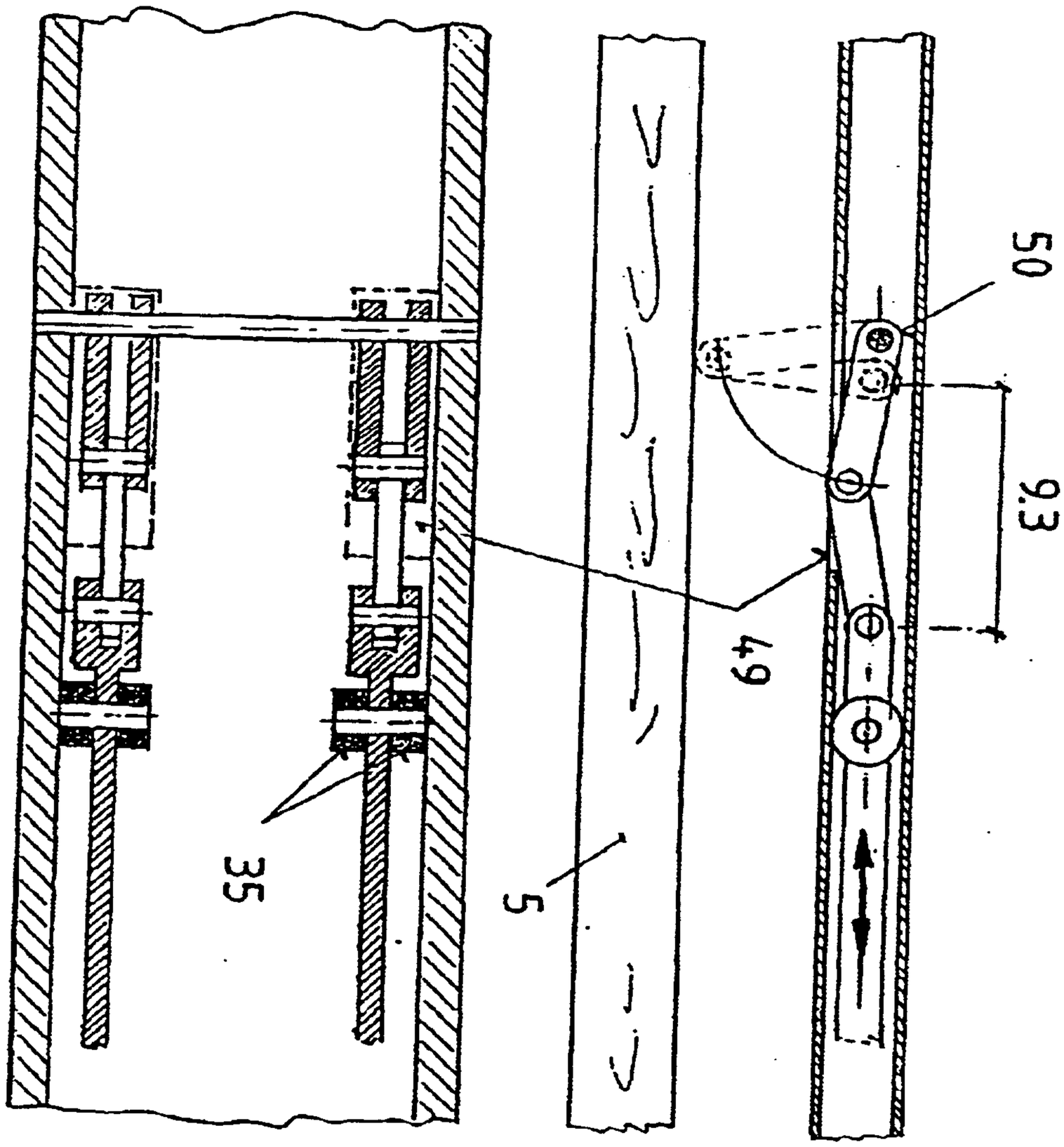


FIG. 29

Variant pantograph



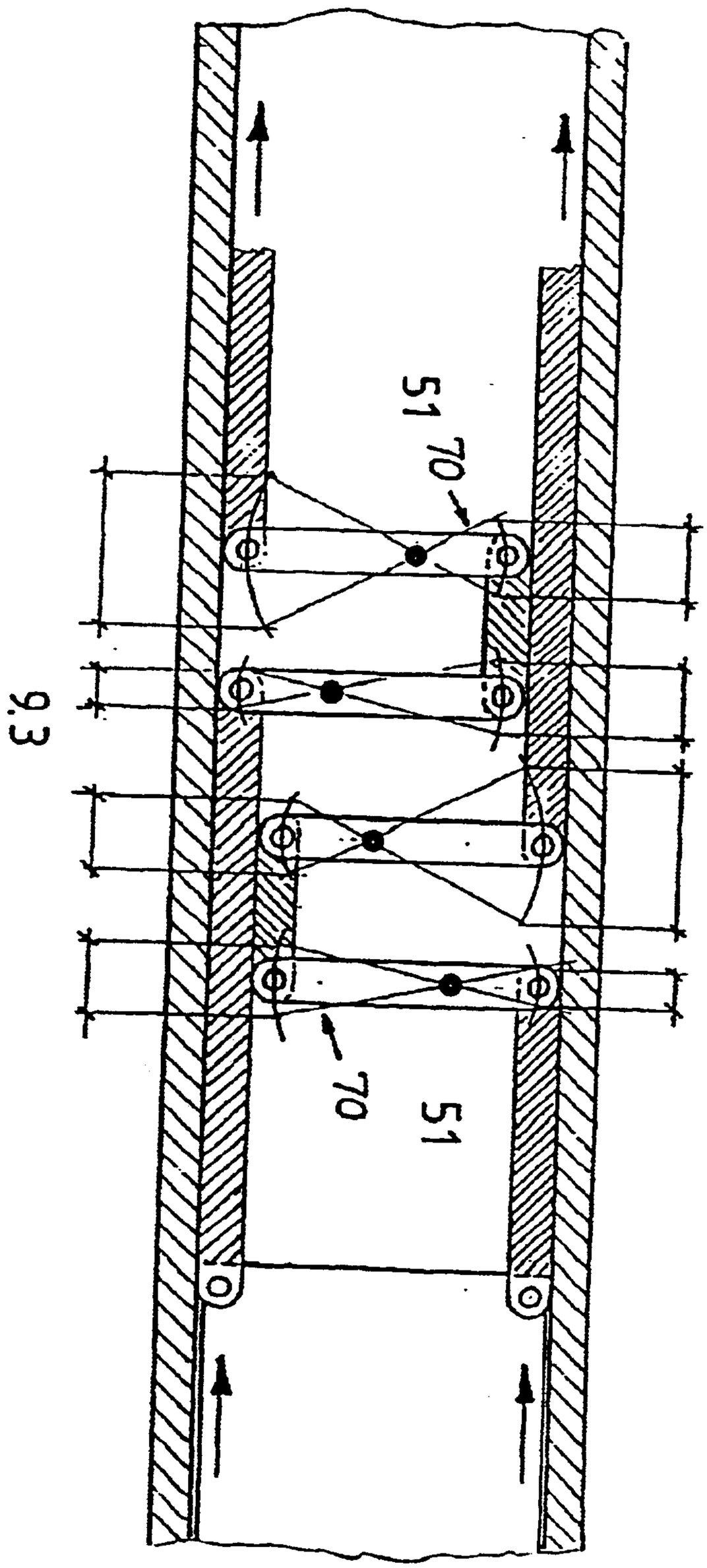



FIG. 30

Travel multiplication

FIG. 31

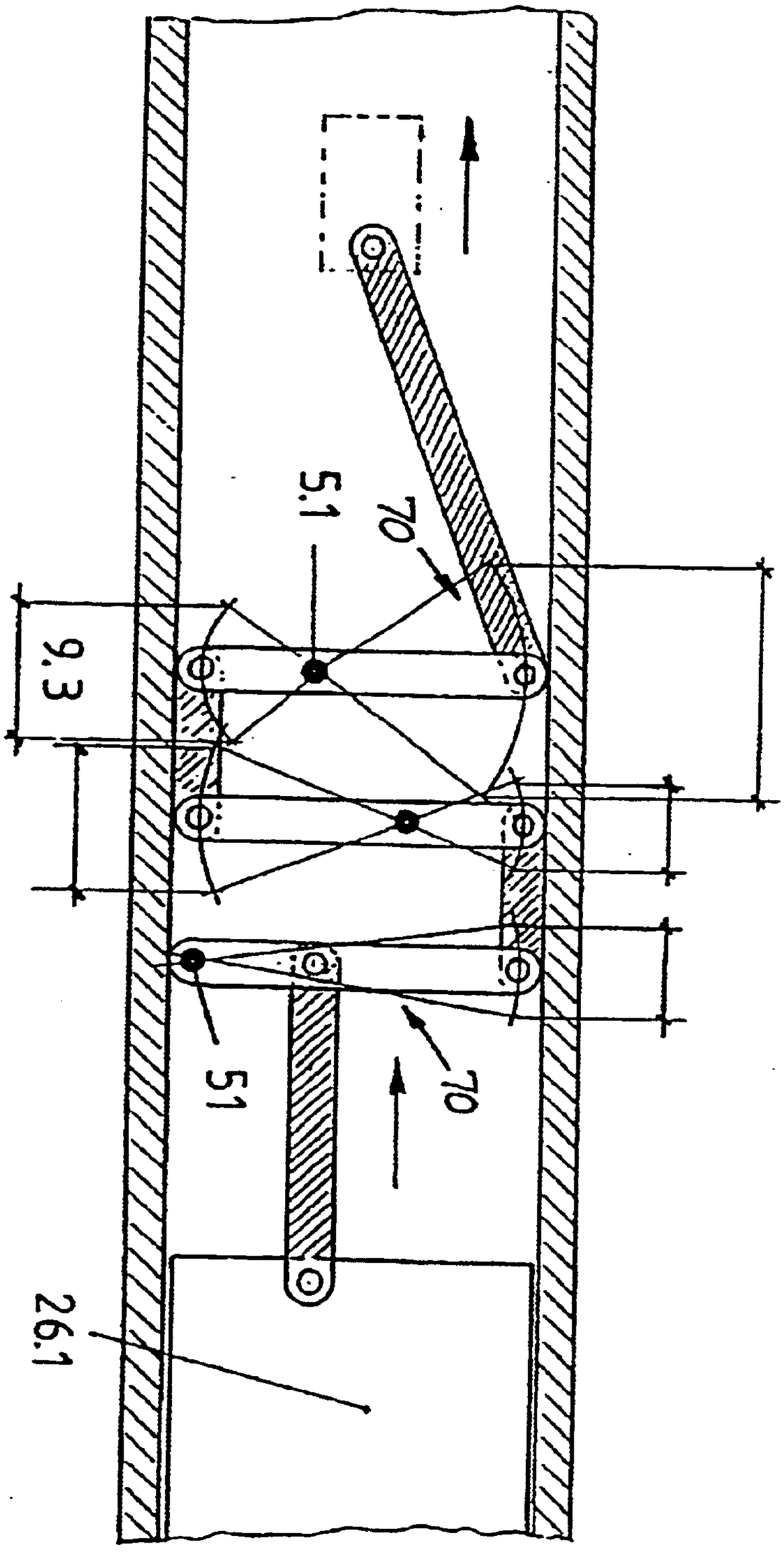
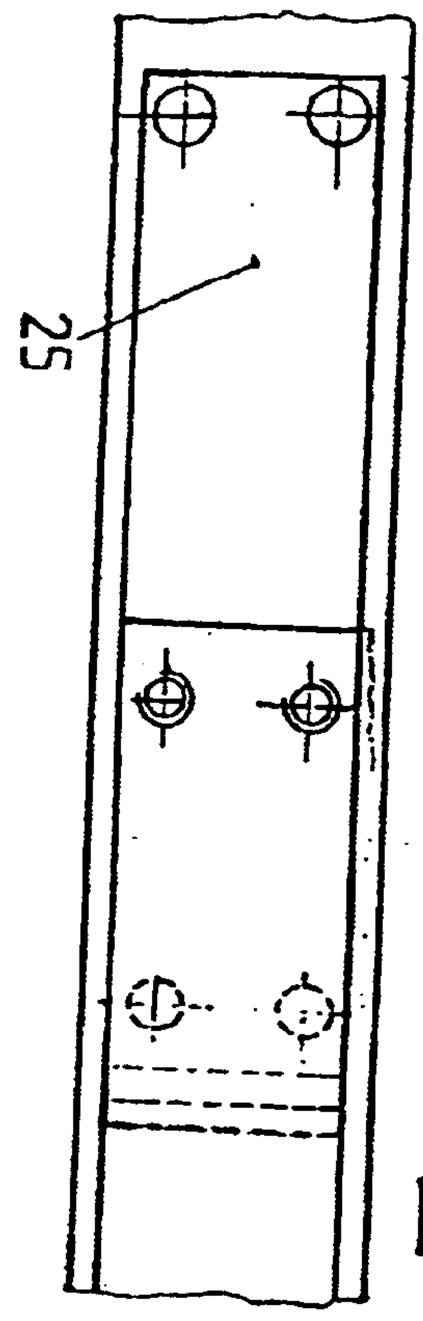
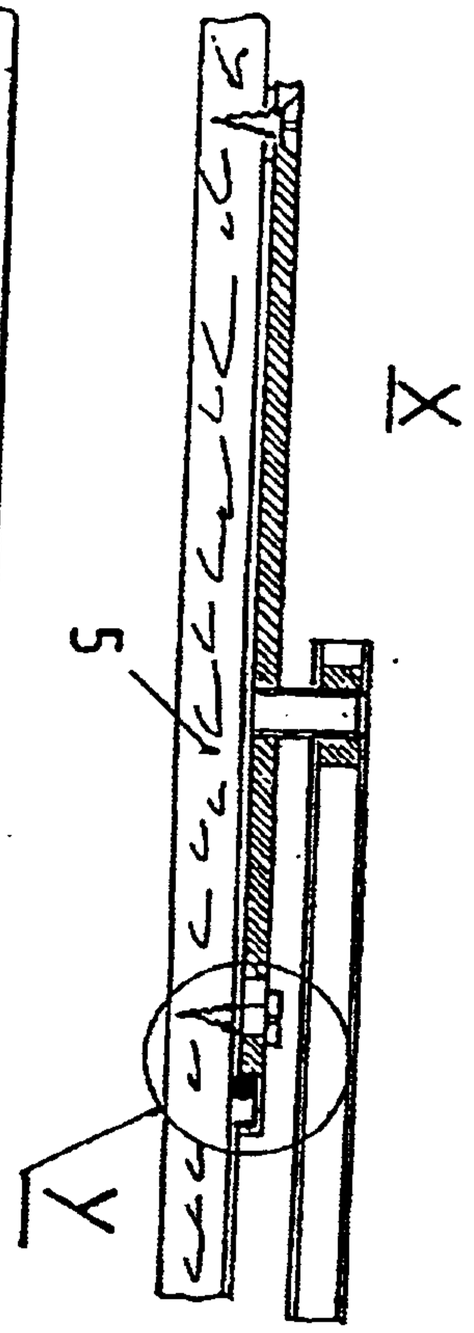
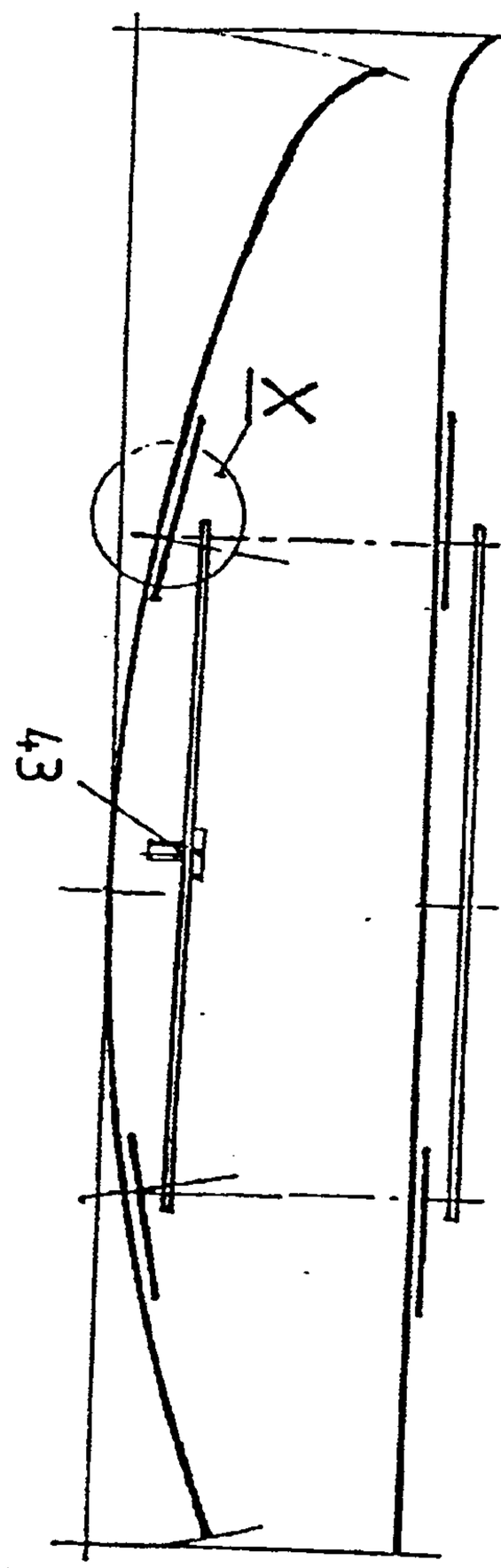


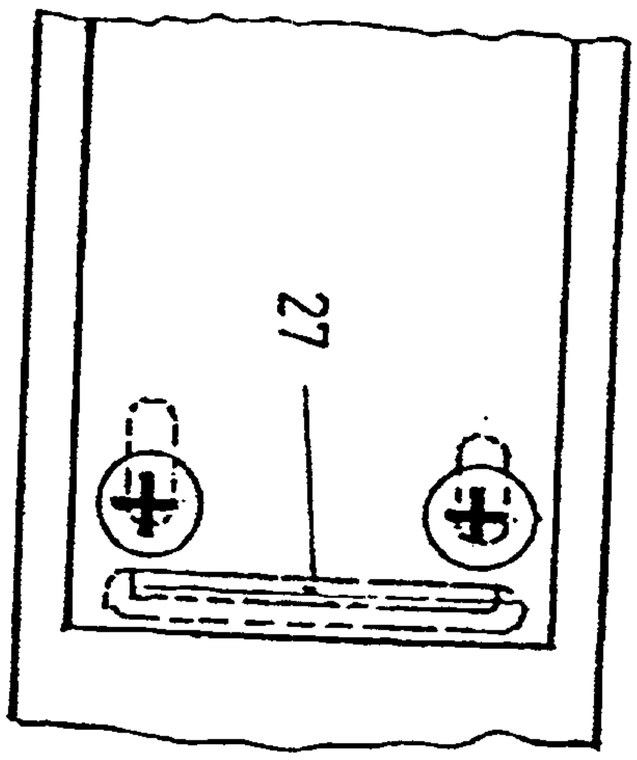
FIG. 32

Force transmission system



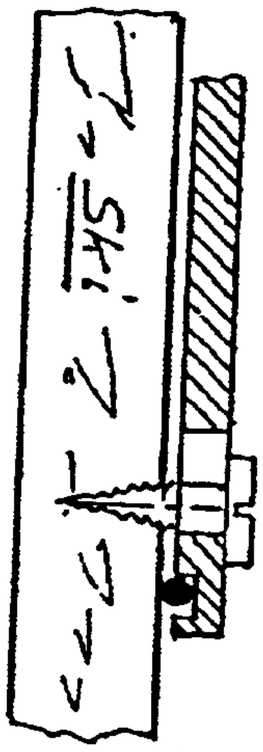



FIG. 33

Force transmission function

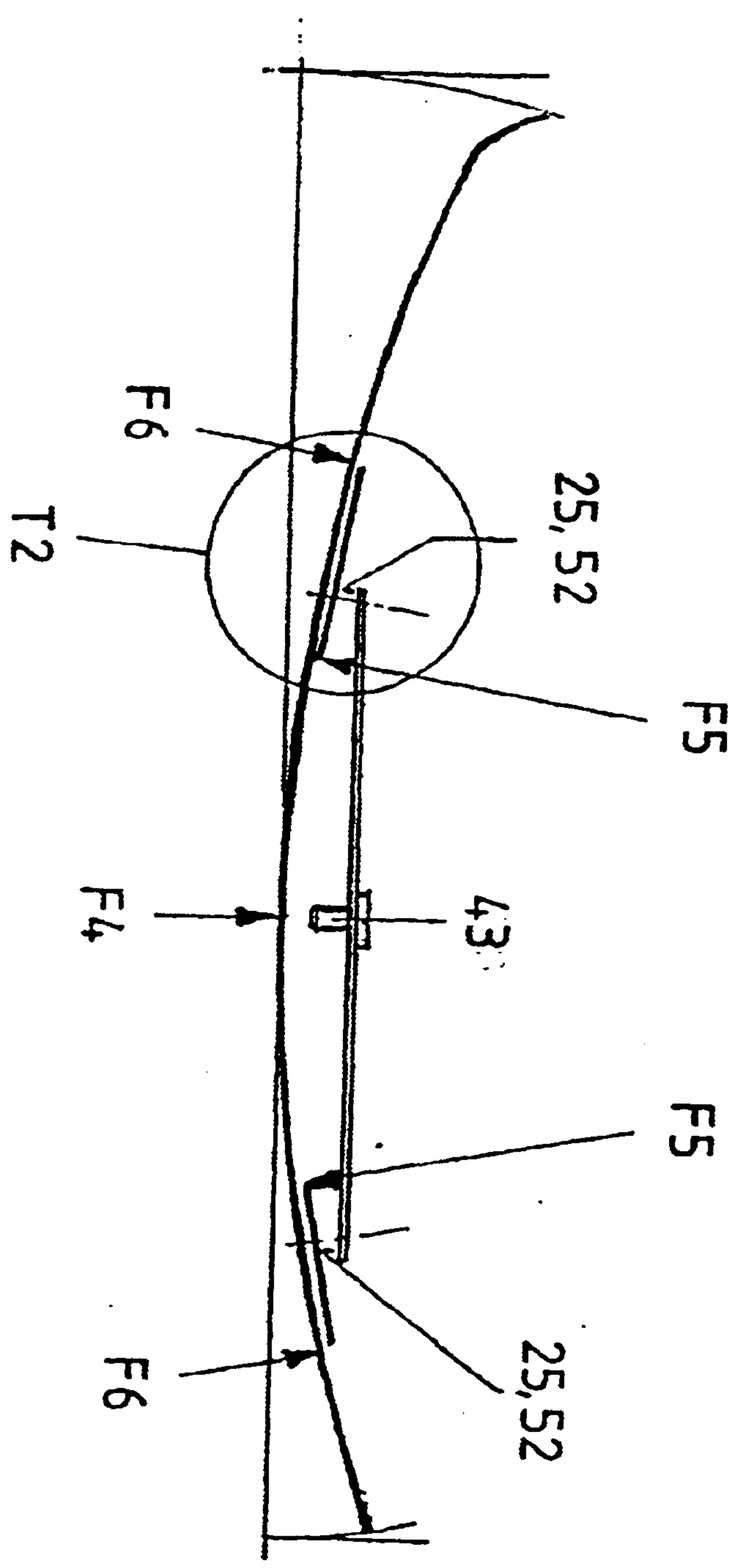
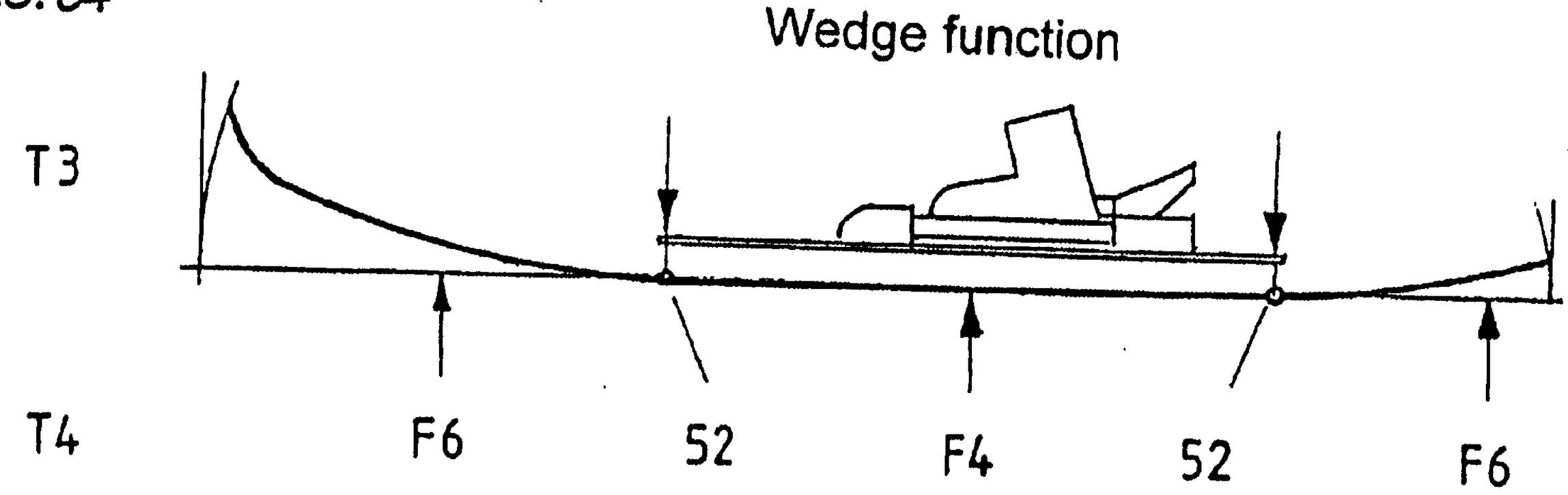


FIG. 34



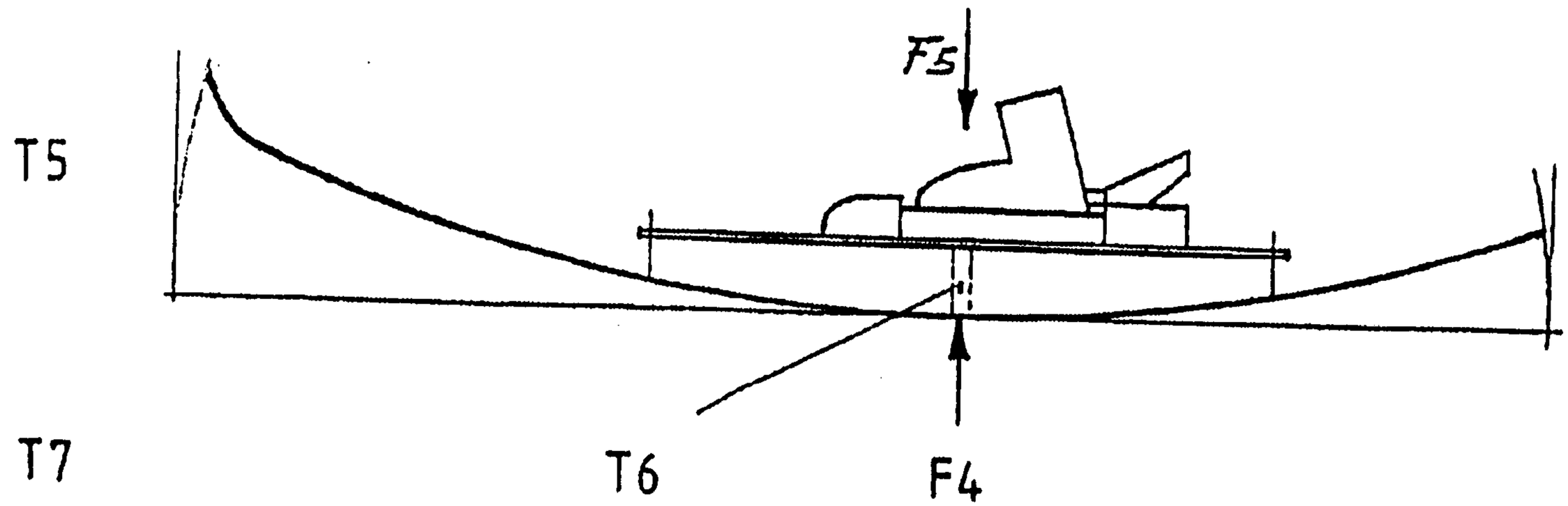




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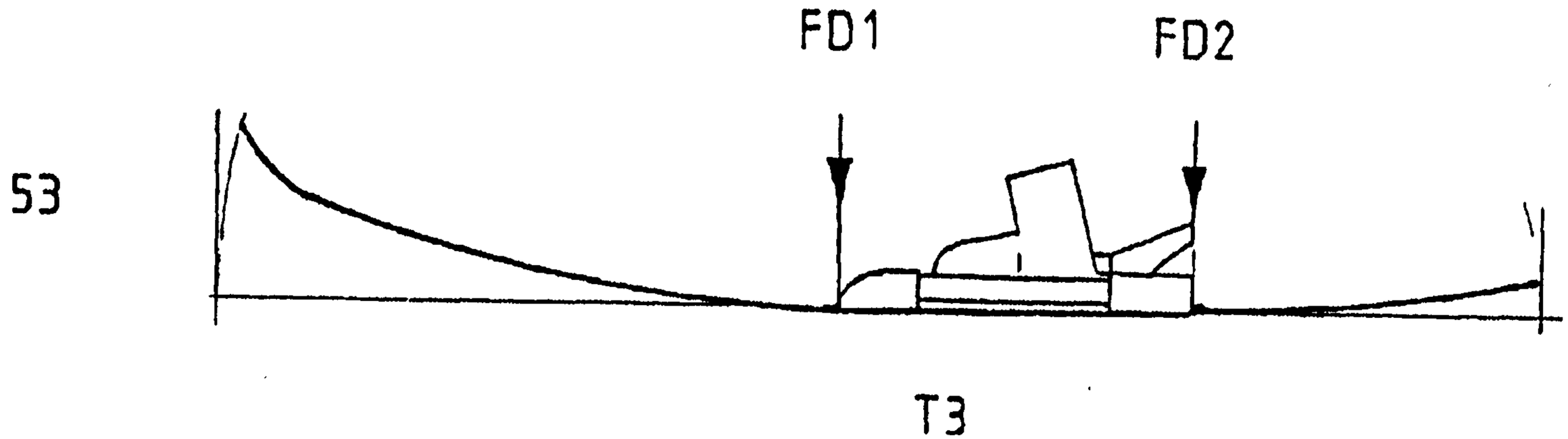
FIG. 35

Effect of the guide pressure point



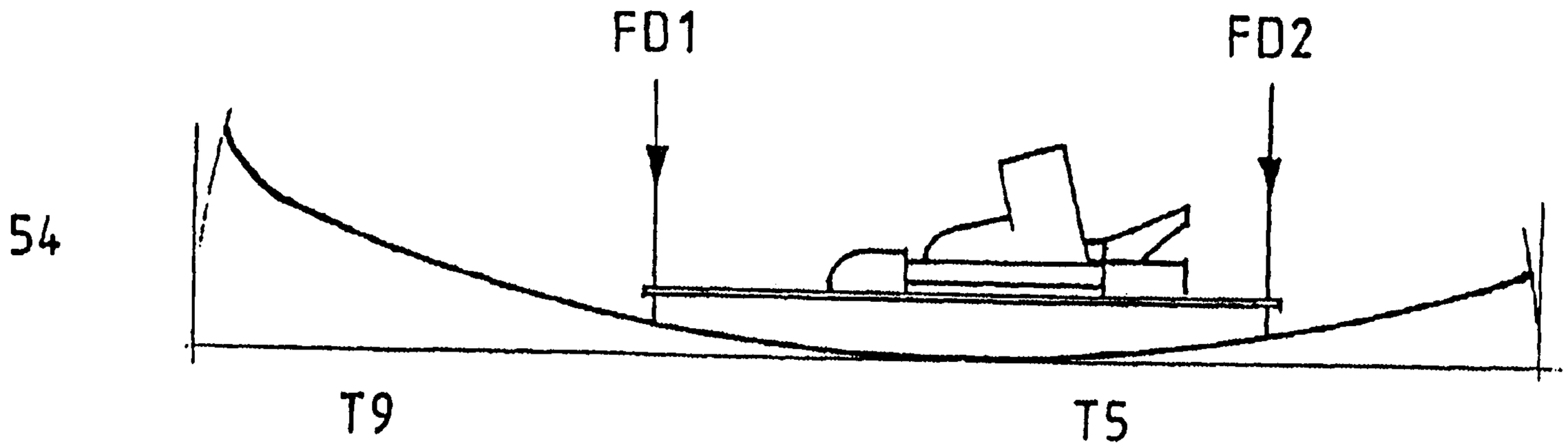



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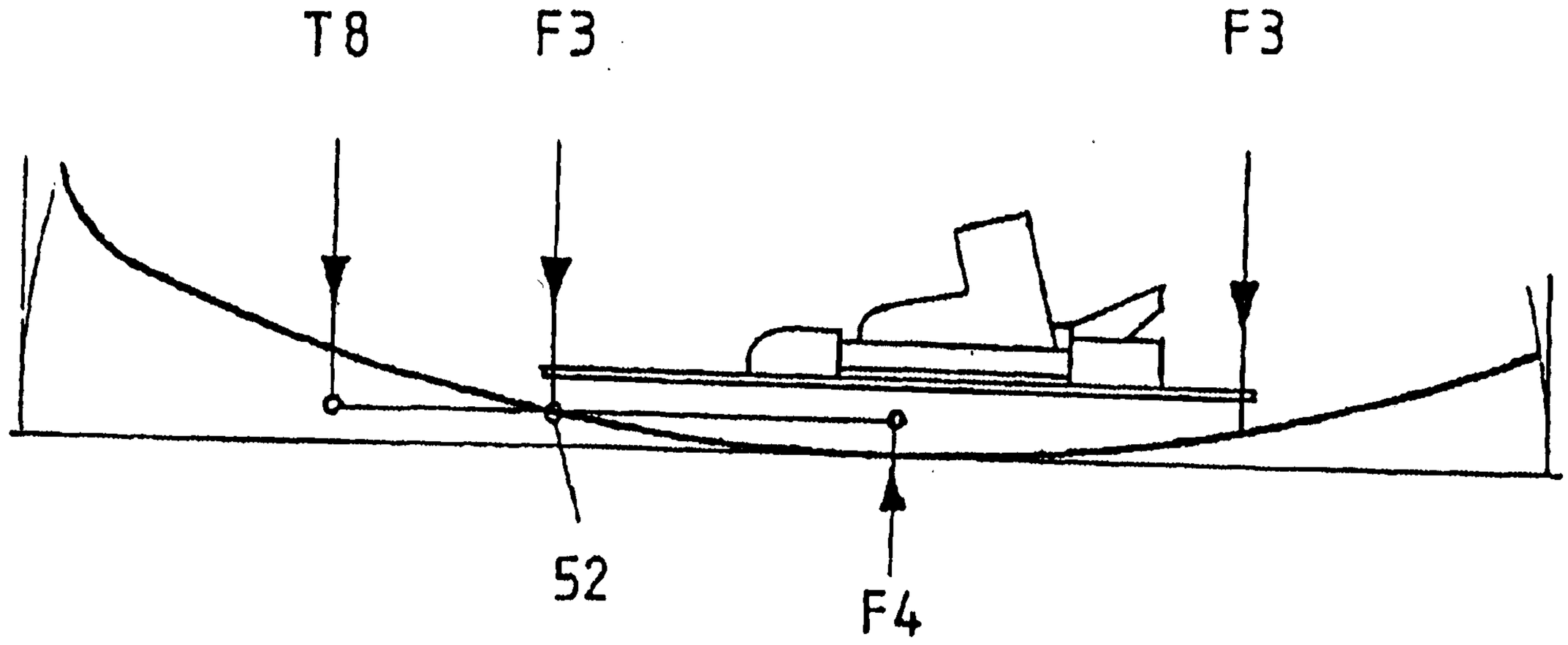
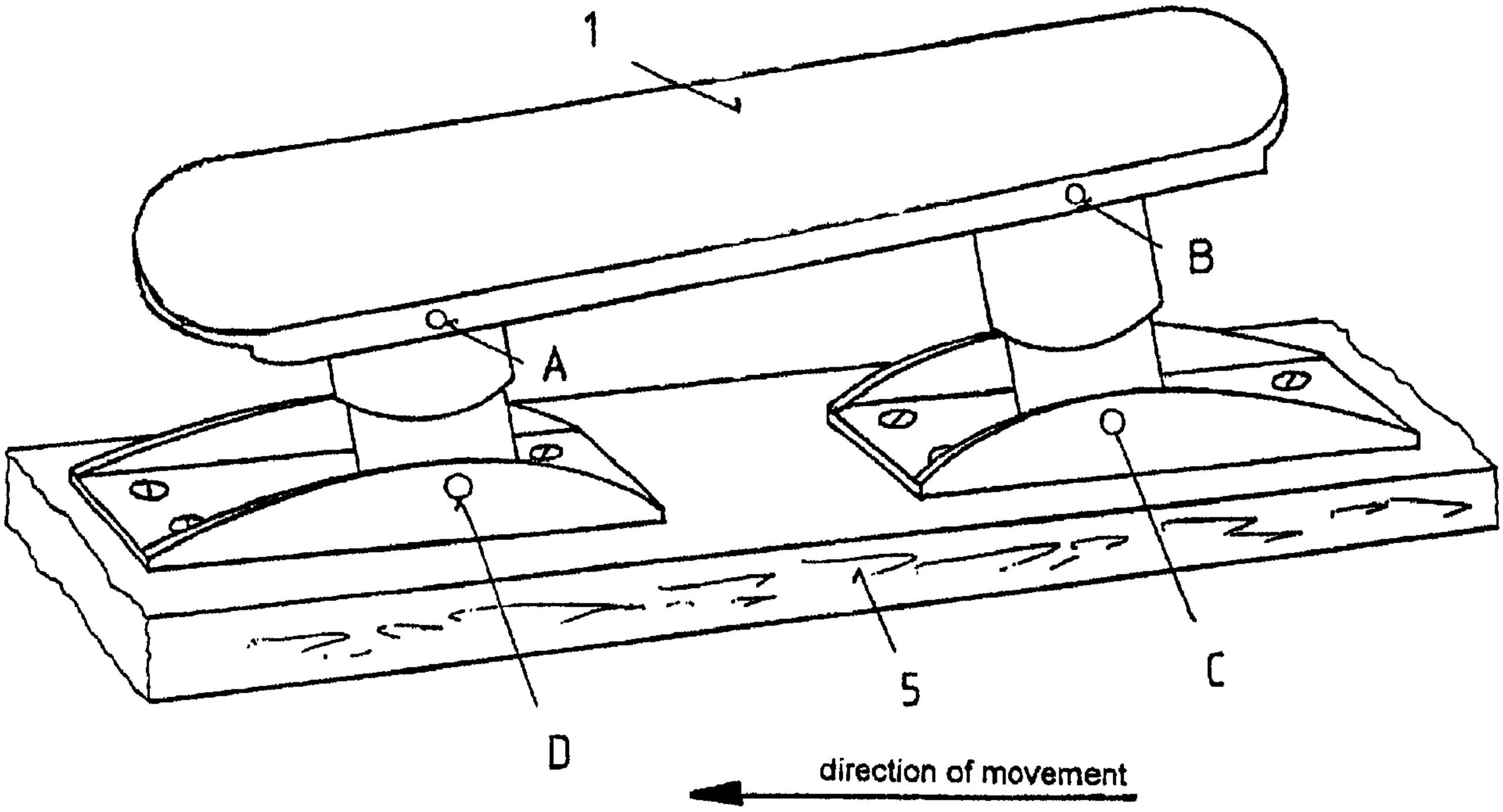
FIG. 36

Force compensation according to the lever principle




1
A
B
C
D
5
direction of movement