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(54) Progressively acting hauling device for ski-lifts, with centrifugal brake.

(57) A hauling device (10) for ski-lifts, equipped with a winding drum (15) for a rope (12), subjected to the recall action by a recall spring and with a centrifugal brake, comprises as the centrifugal brake at least a shoe (21) swingingly assembled on the drum (15), and intended for cooperating with the inside cylindrical surface (26) of a casing (11) which encloses the drum, the centrifugal brake, and the recall spring. The shoe (21) consists of a body moulded from plastic material, incorporating a metal mass (27), and is provided with a gasket (32) of self lubricating plastic material. The gasket (32) can be clutched on the body of shoe (21), and, in order to avoiding hydrodynamic lubrication effects in the presence of liquid inside the casing (11), the gasket (32) is positioned by engaging a tooth (35) protruding from the shoe (21) inside a groove formed between ribs (33) protruding from the gasket (32), its swinging being allowed around an axis parallel to the rotary axis of the shoe (21).

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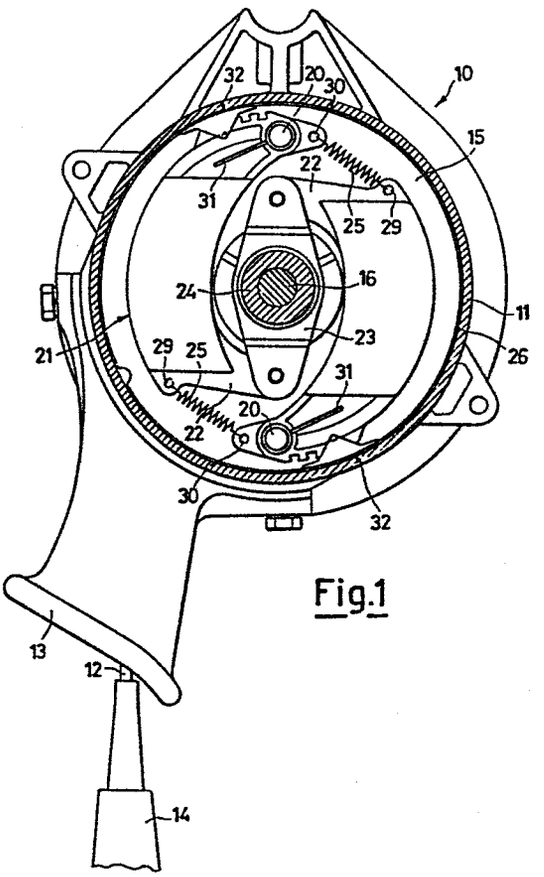
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Fig.1

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DESCRIPTION

The present invention relates to a progressively acting hauling device for ski-lifts, and is particularly relating to the centrifugal brake with which the recall device is provided of the rope to which the skier clings.

It is known that the hauling devices consist of essentially three parts: a joint to the hauling cable, an intermediate connecting element, and a joint for the skier.

The intermediate connecting element consists of the rope suitable to be wound on a drum, on which a recall spiral spring is active, as well as of a centrifugal brake, whose purpose is of increasing the force necessary to cause the rope to be unwound, and of preventing a too rapid rewinding of the same, under the action of the said spiral wing.

Different shapes are known for the centrifugal brakes for said recall devices. They comprise substantially at least a shoe provided with a high weight mass, said shoe being pivotally connected to the winding drum for the rope, and being kept by the action of a spring at a given distance from the inside cylindrical surface of the casing which encloses the recall device. By turning the winding drum, either in a direction or in the other, whether the rope is drawn from the casing and hence unwound from the drum, or it is recalled into the casing and hence rewound on the drum, the brake shoe is centrifugally pressed against the inside surface of the casing, thus applying its braking force.

The shoe(s) of such centrifugal brakes are usually

realized as a single formed metal piece, whose mass is high enough to the purpose of exerting the centrifugal force. These shoes undergo oxidation and corrosion by the humidity which can possibly penetrate inside the casing and, mainly after an inactivity period (during the summer) they are exposed to seize up, and to be not any more fully operating upon subsequent restarting of the plant.

Eachone of these shoes moreover bears a gasket of friction material, which is usually cemented, or otherwise made solid with the metallic body of the shoe. This gasket undergoes wear, and when it is worn down, the whole shoe must be replaced.

To the purpose of eliminating the drawbacks of these centrifugal brakes known, by the same Applicant a centrifugal brake has been proposed for hauling devices, provided with at least one shoe consisting of a body moulded from plastics incorporating a metallic mass, on which body a separated gasket is clutched and hence rigidly constrained, of self lubricating plastic material, such gasket being interchangeable, and having the two opposite ends directed towards the turning directions of the shoe pointedly shaped.

In this type of centrifugal brake for hauling devices, thanks to the fact that the shoes have been made of moulded plastics inside which the metallic mass is incorporated, this latter is securely fastened on to the body of the shoes, and protected against corrosion and oxydation, so that even after long inactivity periods, the shoe is not liable to jam.

The forming of the shoe by moulding as a single

piece with all its functional components can take place as a single stage, without any need of subsequent processing.

The gasket of the shoe, being a separated component equipped with rapid fastening means, can be easily assembled on the body of the shoe and replaced when it is worn down.

The particular shape of the gasket, with its pointed ends, has the purpose of securing the braking action also in the presence of liquid matter inside the casing, which shall be removed by the pointed ends of the gasket, thus eliminating any hydrodinamic lubrication effect (aquaplaning).

Upon practically operating this centrifugal brake for hauling devices, it resulted however that the problem created by the effect of hydrodynamic lubrication has not been solved in a fully satisfactory way. It happens indeed from time to time that, notwithstanding the pointed shape of the ends of the gasket, the moisture penetrated inside the casing penetrates between the outside surface of the gasket, and the inside cylindrical surface of the casing, thus forming a hydrodynamic bearing between said surfaces, which severely reduces or nullifies the braking action.

Purpose of the present invention is therefore of further improving the centrifugal brake for hauling devices according to the Applicant's preceding proposal, in order to conclusively solving the problem involved by the so-called "aquaplaning" and to securing the perfect efficiency of the brake even in the presence of water inside the casing.

In view of this purpose, it has been thought about assembling the gasket on its shoe not in a rigid way, but with the possibility of swinging around an axis parallel to the swinging axis of the shoe. To this purpose, preferably a plurality of protruding teeth are formed along the periphery of the shoe, closely to its articulation pin, and the gasket is provided on its rear face with a transverse groove suitable to be coupled with one of said teeth, so as to allow limited swinging movings to the gasket, around the coupling tooth, and to achieve a perfect fitting of the gasket to the inside sliding surface of the casing. The penetration of humidity is thus avoided between the braking surfaces, and a more uniform wear is secured of the gaskets.

The invention is illustrated with reference to a particular embodiment in the attached drawings, in which:

Fig. 1 is a side view of the centrifugal brake forming a part of a hauling device, partly in section.

Fig. 2 shows, on an enlarged scale, a side view of one of the shoes of the brake, with the applied gasket in section.

Fig 3 is a sectional view along the line III-III of Fig. 2, and

Fig. 4 is a partial view of the shoe along the arrow IV of Fig. 2.

The hauling device, generally indicated as 10, comprises in a known manner a casing 11 intended for being connected, e.g., fastened to a hauling cable (not shown) of a ski-lift plant.

The casing 11 houses the recall device (not shown) for a rope 12 which goes to the outside through a fun-

nel-form lower orifice 13 of the casing, such rope bearing at its free end a joint 14 for the skier.

This recall device comprises in a known way a drum 15 for winding the rope 12, such drum being rotatably mounted on a pivot 16 supported inside the casing 11 and in a cover tightly applied on the casing, and defining a chamber which houses a recall spiral spring fixed at one of its ends to said cover, and at the other end at a hub coupled with said drum 15. This spiral spring tends to rotate the drum 15 in the winding direction of the rope.

One side of the winding drum 15 is provided on diametrally opposed positions, with two articulation pins 20 for two shoes 21 which have their opposite end 22 hook like shaped, and are loosely hooked to a brake guide 23 mounted on the hub 24 of drum 15. Springs 25 connect the two shoes 21 to each other in order to holding them, under static conditions, spaced apart from the inside cylindrical surface 26 of the casing 11.

As is particularly evidenced in Figs. 2 - 4, each shoe 21 consists of a shaped body moulded in one single piece from plastics, said body completely enclosing a metallic mass 27, which confers to the body itself the necessary weight for the centrifugal action. This shaped body moreover is already provided with all functional components, such as in particular the hook 22, a through hole 28 suitable to house the articulation pivot 20, as well as bores 29, 30 for hooking the springs 25. It shall be noticed that the hole 28 for the pivot 20 communicates with a slit 31 which makes the same hole elastically en

largeable and allows an elastically blocked coupling to be realized with the pin 20, thus securing a silent and smooth operating of the brake.

As the metallic mass 27 is completely incorporated within the body of plastics of the shoe 21, it is as a result not only constrained to the body itself, but also protected from corrosion and oxydation.

The shoe of plastics bears moreover a gasket 32, which, according to the invention, is mounted on the body of the shoe itself so as to be able to slightly swing and to be easily replaced. In particular, this gasket 32, which is made from self lubricating plastic material, is provided on its rear side with two transverse ribs 33 as a single piece, which define between each other a groove intended for being coupled with one from a series of transverse teeth 35 peripherically protruding from the body of plastics of the shoe 21 (see Fig. 2). The coupling between the rear groove of the gasket 32 and the tooth 35 is such as to allow a limited swinging of the gasket around the slightly enlarged and rounded head of the tooth 35, so as to secure during the braking action the perfect fitting of the outside surface of the gasket to the inside cylindrical surface 26 of the casing 11. In such a way, not only a more uniform wear of gasket 32 is obtained, but above all, thanks to the perfect fitting of the gasket to the inside surface of the casing, the forming is avoided of a hydrodynamic bearing between the braking surfaces, and the phenomenon of "aquaplaning" is avoided.

To this purpose helps the profile of the gasket too with its two opposite ends of pointed shape 34 faced

towards the turning directions of the shoe 21 (see Fig. 4).

The purpose of these sharp ends is of removing the liquid matter possibly penetrated inside the casing 11.

The gasket 32 is additionally provided with two flexible side fins of substantially triangular shape 36 with enlarged free ends 37, whose purpose is of radially holding in position the gasket on the shoe, by acting in cooperation with side shoulders 38 of the shoe itself, without preventing said gaskets from swinging.

The transverse teeth 35 are provided on the periphery of the shoe 21 in the nearby of its through hole 28 suitable to house the articulation pivot 20. The presence of such teeth 35 makes it possible to move the gasket 32 from tooth to tooth, thus allowing the braking force to be varied. Indeed, the closer the gasket is mounted to the shoe articulation axis, the larger is the braking force.

The assembling of the gasket 32 on shoe 21 and hence the replacement of the gasket after its wearing down can be carried out with the highest ease and rapidity. Indeed, slightly divaricating the flexible fins 36 of the gasket 32 is sufficient to the purpose of disengaging their tips 37 from the side shoulders 38 of the shoe, and consequently of allowing the gasket to be radially removed.

The operating way of the centrifugal brake described is not different to that of known brakes of this type and a detailed description of it is therefore not necessary. The brake is active in both the turning directions

of the winding drum 15, that is to say, when the rope 12 is being extracted from the casing 11 and is unwound from the drum, as well as when the rope 12, due to the action of the recall spring, is returned inside the casing, for being rewound on the drum.

By means of the new shaping of the brake shoes according to the present invention, many advantages are obtained, which can be clearly understood from the above set forth disclosure, and that are related to the manufacturing of the shoes, and to the assembling of them, as well as to their running and durability in time, without requiring frequent maintenance interventions. In particular, thanks to the perfect fitting of the gaskets to the sliding surfaces of the casing during the braking, guaranteed by the possibility of the gaskets to swing relatively to their respective shoes, it has been conclusively solved the problem of "aquaplaning" and the perfect operating of the brake has been guaranteed under all conditions, in addition rendering the wear of the gaskets more uniform.

Claims

1. Progressively acting hauling device (10) for ski-lifts with winding drum (15) for a rope (12) subjected to the action of a recall spring and of a centrifugal brake comprising at least a shoe (21) intended for co-operating with the inside cylindrical surface (26) of a casing (11) housing the drum (15), the centrifugal brake and the recall spring, said shoe (21) consisting of a body moulded from plastic material incorporating a metallic mass (27), and bearing a gasket (32) distict from it and consisting of self-lubricating plastic material, characterized in that the gasket (32) is mounted on the periphery of the body forming the shoe (21), so that it can swing around an axis parallel to the turning axis of the shoe (21).

2. Device as claimed in claim 1, characterized in that the gasket (32) is provided on its rear side, as a single piece with it, with two transverse protruding ribs (33), defining a groove between each other, and that on the periphery of the body forming the shoe (21) at least a protruding transverse tooth (35) is provided, suitable to be coupled with the rear groove of the gasket (32), so as to allow the same to carry out limited swinging movings around said tooth (35), means (36-38) being provided for radially holding in position the gasket (32) on the body of the shoe (21).

3. Device as claimed in claim 2, characterized in that the body of the shoe (21) is provided with a plurality of protruding teeth (35) in the nearby of its articulation axis (20) to the winding drum (15), the gasket (32) being liable to be choicely coupled with one of

said teeth (35).

4. Device as claimed in claim 2, characterized in that said means for radially holding in position the gasket (32) on the body of the shoe (21) consist of flexible side fins (36) formed as one single piece with the gasket (32), said fins (36) having a substantially triangular shape with their free ends (37) being enlarged and suitable to cooperate with side shoulders (38) of the body of shoe (21).

5. Device as claimed in claim 2, characterized in that said teeth (35) have an enlarged round head.

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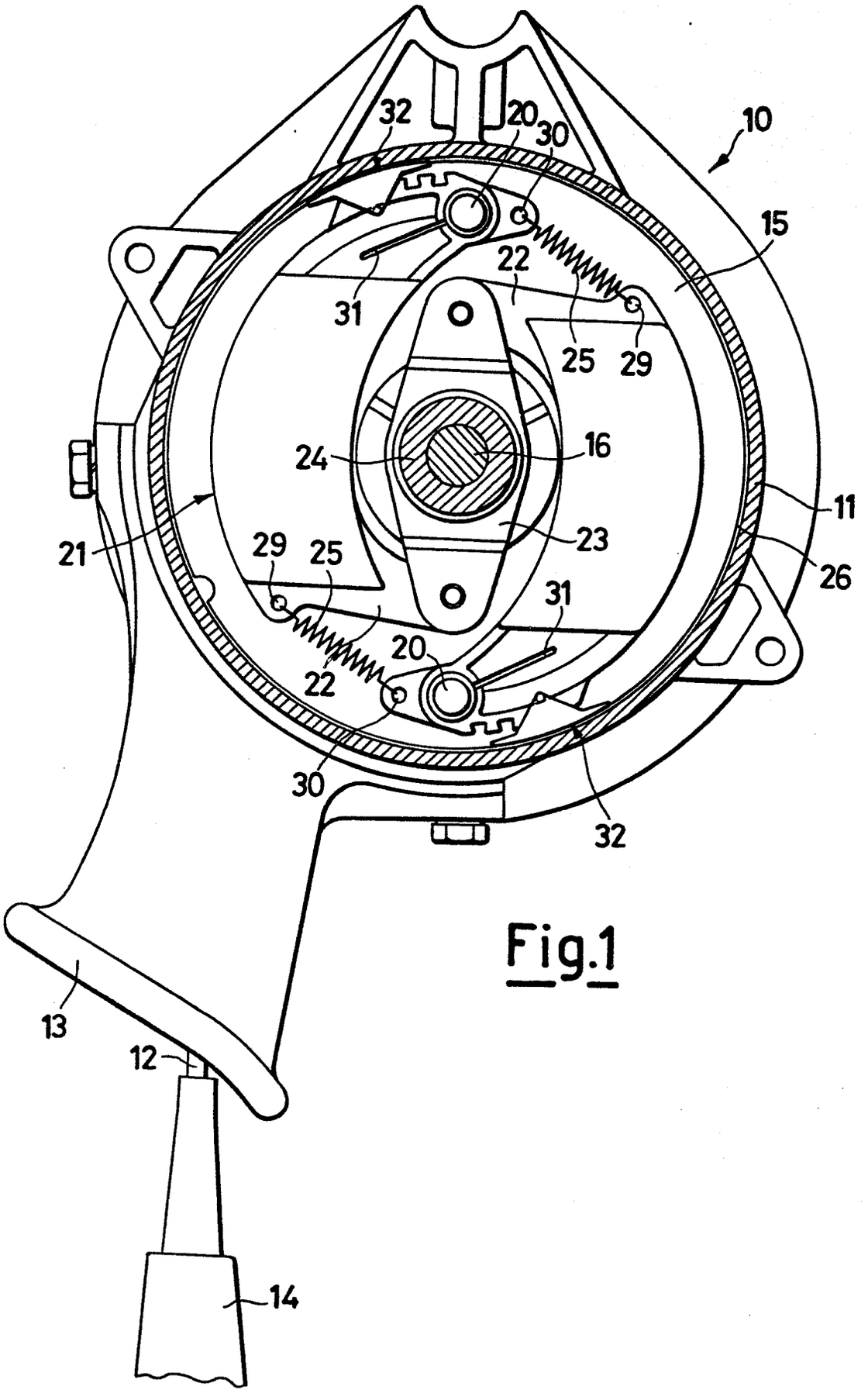

Fig.1

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Fig.2

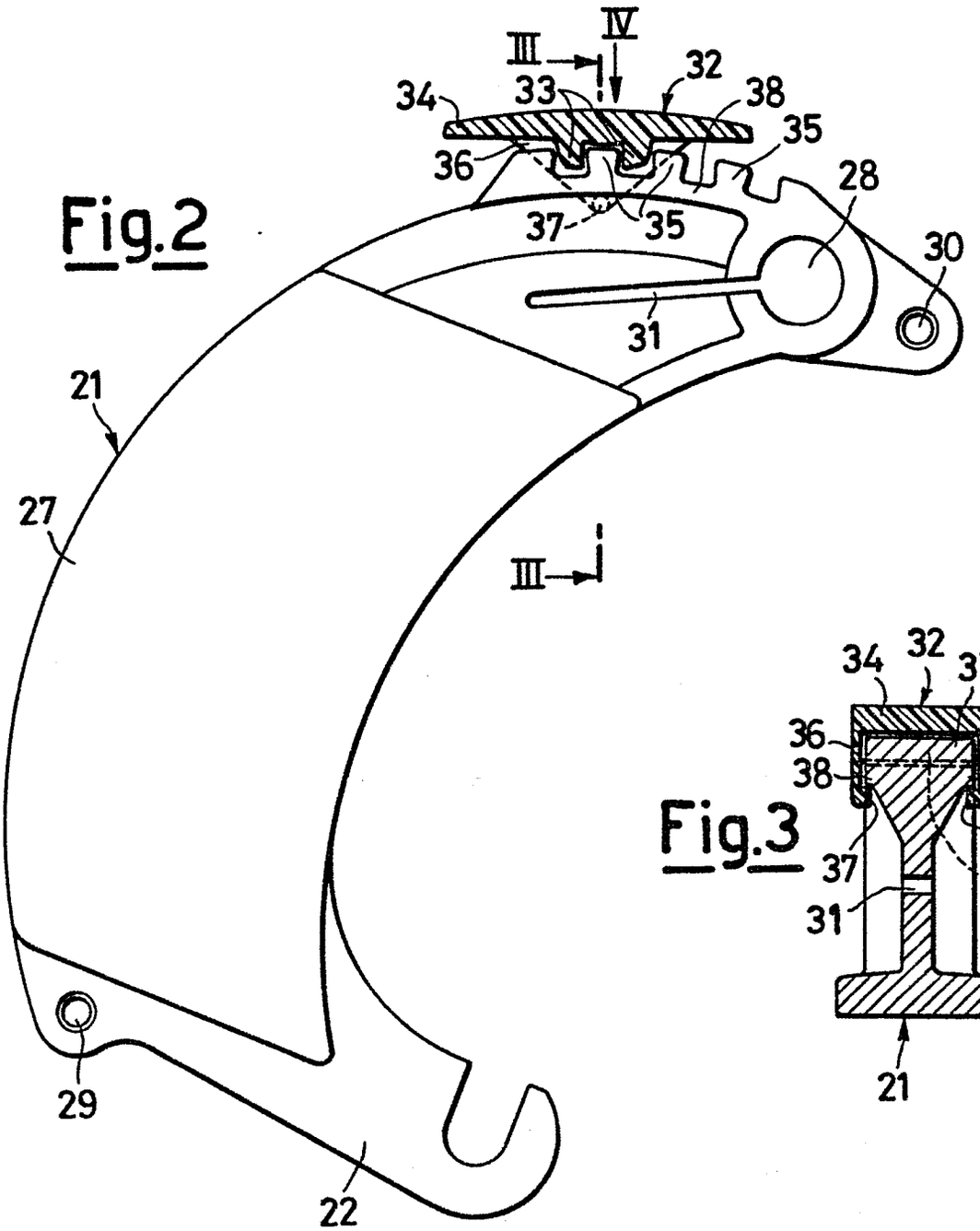

Fig.3

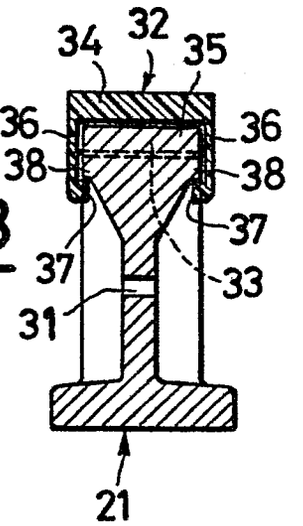

Fig.4