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(54) **A railway car retarder for shunting purposes.**

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Description

Background of the Invention

The present invention refers to a railway car retarder for shunting purposes of the type using a mechanical friction brake and constituting a unit, one or more of which are anchored along a railway track, said unit being provided with an actuating member connected to a pivotable mainly horizontal shaft, said member, when contacted by wheels of passing railway cars, being adapted to exert a retarding effect on said wheels provided the car passes in the intended braking direction.

Braking units of this type are known in several structurally different embodiments. A common feature of the embodiments which in recent years have been used ever more is that they are of hydraulic type, at which the passing wheel via a pedal, a ramp or the like is urged to pump a hydraulic liquid in a closed circuit in the braking unit. The liquid passes thereby a flow depending throttling device, which means that the work will be big at high flow speeds and neglectably small at low flow speeds.

Hydraulic systems with the energy absorption here concerned require qualified material and precision manufacture whereby they will also be expensive. It is also difficult to make e.g. inlets for shafts and piston rods thus that they during several years and in severe working environment will be leak-proof. The demands for leakproofness and cleanness furthermore mean that inspection and adjustment of the inner components of the brake can not be accomplished on the field but must take place on especial workshops by particularly trained personnel. The hydraulic brakes furthermore give a certain unintended braking effect even when the cars pass at such a low speed that it is desired that they are not subjected to any braking effect whatsoever.

The hydraulic brake units are also marred with other problems, which make it desirable with a practically useful solution, which does not utilize hydraulics, e.g. in the form of a simple mechanical friction brake, but development in this direction has been hampered by the fact that the brake force must be so accurately balanced that a maximum braking effect is achieved without therefore risking that the brake will lift a light car wheel from the track. A hydraulic pressure can be adjusted very accurately whereas friction coefficient variations at e.g. a disc brake can give considerable variations in the braking ability due to temperature and moisture variations, material wear etcetera. A well designed hydraulic brake has consequently a long life span and mainly constant braking characteristics as this brake will get adequate lubrication and is subjected only to a minimum of wear as the braking work is transferred into heat due to flow losses in the liquid and not by mechanical friction. At mechanical brakes it is on the contrary inevitable that the friction surfaces are subjected to a certain wear, which necessitates a continuous re-adjustment of the positions of the braking surfaces concurrently with the wear. Finally it is rather simple to design a hydraulic brake thus that the flow speed of the hydraulic liquid constitutes a representative measure of the speed of the car wheel passing the brake, and it is hereby no problem to provide the system with a flow depending valve, which controls the relation between the car speed and the throttling effect. At disc brakes or similar mechanical brakes there is on the contrary no real relationship between speed and braking moment, but the braking moment is quite independent of the speed.

GB—A—733 207 describes a device for retarding the wheels of a rail-bound vehicle, which device comprises small braking units arranged along a railway track, each braking unit being provided with an actuating member subjected to the force of the vehicle wheel and connected to a mainly horizontal shaft, the motion of which is braked, primarily by means of mechanical friction elements, thus that kinetic energy is obsorbed. When a wheel passes the device the rocker arm will be raised swiftly, and it will due to its mass swing far past its upright balance position. The freewheel clutch will then lock the arm in its turning position as the force acting to raise the arm again must be small compared to the braking power of the device. The arm thus will be caught in a position inclined against the direction of arriving wheels, and the angle can in accidental cases be such that next wheel has no ability to pivot the arm, with the consequence of something breaking.

The Purpose and Most Essential Features of the Invention

The purpose of the invention is to provide a railway car retarder for shunting purposes and of the type used as one or more units anchored along a railway track, each unit being provided with an actuating member, which when contacted by wheels of passing railway cars will exert a retarding effect on these provided the speed of said wheels exceed in adjustable value pre-set for each retarder unit, and the intention is to provide a car retarder with the basic good features of the mechanical friction brake, but which is made in such a manner that it can match the hydraulic brake in the abovementioned important details, and such a solution has been achieved thereby that the actuating member is connected to a pivotable, substantially horizontal shaft, provided with a speed dependent freewheel coupling connected to the hub of a braking device in such a manner that the shaft is coupled to the braking device if a car passes in the intended braking direction at a speed exceeding said adjustable value, whereas coupling fails to occur if the car has a lower speed or passes in the opposite direction.

Description of the Drawings

The invention will hereinafter be further described with reference to embodiments shown in the accompanying drawings.

Figure 1 shows in a schematic cross-section an embodiment of a railway car retarder according to the invention.

Figure 2 is a schematic side view of the braking part of the car retarder shown in an alternative embodiment.

Figures 3 and 4 show schematically different self-adjusting means for the car retarder shown in figure 1, and

Figure 5 shows in a schematic cross-sectional view a part of an actuating member forming part of the car retarder according to the invention.

Description of the Preferred Embodiments

The railway car retarder 1 according to the invention is located on the inner side of railway rail 2, and it incorporates an actuating member 3, in the embodiment shown shaped as a lever, which in neutral position is directed mainly straight upwards and which at its upper end is provided with a pedal roller 4 arranged to be hit by a passing, not shown, railway car wheel. The actuating member 3 is at its end remote from the pedal roller 4 non-pivotally connected to a substantially horizontal shaft 5, which is pivotably supported in the car retarder housing 6, and which, when the pedal roller 4 is hit by the flange of a passing car wheel, causing the lever 3 to be pushed down to a mainly horizontal position, will make a pivoting of about a quarter of a revolution. On the shaft 5 there is arranged a speed dependent coupling, which resembles to a common freewheel coupling and consists of a hub 7 formed on the shaft, rollers or locking bodies 9 which are guided in a rolling body retainer 8, and an outer sleeve 10 located outside said retainer and being shaped thus that the locking bodies can be wedged between hub and outer sleeve and thereby transfer a moment between them. The rotational speed of the shaft is at the beginning of its rotation directly proportional to the speed of the car wheel, and the movement starts instantaneously. It is this movement which is sensed by the speed depending coupling and in the same manner as in a freewheel coupling this transfer of moment can take place when the shaft is pivoted in one direction only. In the device according to figure 1 such a connecting action is achieved when the pedal roller 4 is moved in a direction inwards into the paper.

There is however an important difference between a common freewheel coupling and the coupling according to the invention in that the former has spring-loaded locking bodies, which make the moment transfer start immediately when the shaft is rotated in its working direction, whereas the coupling forming part of the car retarder is instead provided with the heavy roller retainer 8, which is readily rotatable on the shaft 5. The roller retainer is maintained in a rest position as long as a projection 11 is pressed against a shoulder 13 on the shaft by means of a spring 12. The locking bodies 9 are in this position held by the retainer 8 in such a position relative to the hub 7 that the locking bodies can not span the gap between hub and outer sleeve 10, therefore the coupling can not engage.

For allowing this to occur it is necessary that the roller retainer 8 is rotated a certain, small angle backwards relative to the shaft.

As earlier mentioned the rotation of the shaft begins almost instantaneously when a car passes the retarder in braking direction. Due to the gravity of the roller retainer 8 and the suitably chosen biasing force of the spring 12 the retainer 8 will not start to rotate as swift but will lag behind somewhat just at start, whereupon it will swiftly again take up its resting position relative to the shaft. The retainer will thus make a short movement backwards in relation to the shaft, whereby the maximum angular movement is a measure on the speed of the passing car. By using a correctly chosen design and force of the spring 12 in relation to the mass of the roller retainer is it possible to achieve that the maximum angular deflection at a certain car speed corresponds to the position where the locking bodies contact both hub 7 and outer sleeve 10.

Thus the desired coupling function has been achieved, i.e., the coupling catches as a freewheel coupling only if a car passes in the braking direction and has a speed exceeding a certain level. Cars having a lower speed or cars passing in the opposite direction will not cause the coupling to catch.

The braking part is shown in figure 1 in a simplified embodiment from which it appears that the outer sleeve 10 is rigidly connected to a brake disc 14 provided with brake linings which can be squeezed between two non-rotating discs 15 and 16. This constitutes the main principle for how braking is effected when the speed sensing coupling catches and urges the outer sleeve 10 to take part in the rotation of the shaft.

There are different ways to design the braking part thus that it will function in the intended manner. Figures 2 and 3 show different embodiments thereof.

Figure 2 thus shows a braking part in the form of a conventional strap brake, which incorporates a brake drum 17 and a brake strap 18 surrounding the drum, which strap via a lever arrangement 19 is held tightened by the power of a pneumatic cylinder 20, which acts upon the brake strap with a force Fa. The opposite end of the strap is fixedly attached and it is loaded with a reaction force Fo. Due to the rotational direction of the brake disc and the dimensions given to the brake it is possible to let the braking force be substantially equal to the actuation force Fa of the pneumatic cylinder, whereby a well defined braking power can be achieved even if the friction coefficient varies. In the figure is also intimated a compensating device made as a wedge 21, which is biased by a spring 22 which is automatically pressed in forward direction if the power source is interrupted and wear tends to give play in the transfer. In this manner is it possible to obtain an automatic wear compensation by turning off the brake.

In figure 3 is schematically shown the actuation principle for the braking part according to the embodiment shown in figure 1, and from this figure it can be seen how the outer sleeve 10 with the associated brake linings 14 is squeezed between the fixed brake disc 15 and the adjustable brake disc 16. The actuation power from a pneumatic cylinder (not shown in the figure) or the like is allowed to act tangentially on the adjustable disc 16, which thereby is adjusted with a helical movement. The outer sleeve 10 is presupposed to rotate in the opposite direction in relation to the adjustable disc 16. If the pitch of the helical movement is small and the thread friction is neglectably low balance is achieved between the actuation moment and the braking moment, as the friction moment directly counteracts the actuation moment. If the friction force exceeds the actuation moment the disc 16 is automatically screwed outwards until the squeezing force against the brake linings have been reduced thus that balance is reached, and if the actuation moment is bigger this will adjust the disc 16 until balance is reached.

In order to eliminate the friction of the helical movement it is possible as shown in figure 4 to substitute the thread with a number of eccentrics 23, which support the disc 16 axially. When the disc is rotated in the direction shown, the eccentrics will rise and press the disc axially against the brake linings (not shown). Due to the fact that the eccentrics are biased by means of springs 24 it is also obtained such a wedge action which gives an automatic wear compensation, which allows the actuation movement of the power source (e.g. the pneumatic cylinder) to be very short.

In figure 5 is shown in cross-section and schematically the upper part of the actuating member 3 and particularly the pedal roller 4 thereof. By means of the car retarder according to the invention it is achieved that the above mentioned tendency of unintended braking occurring at hydraulic brakes is eliminated, but this can instead give rise to bounces at impact between car wheel and pedal roller. In order to provide a solution on this problem the shaft 3a extending from the pedal arm of the actuating member 3 is provided with a bush 25, which at its outer envelope surface is provided with two parallel and spaced apart annular grooves 26, in each of which is arranged in O-ring 27 of suitable size.

The pedal roller 4 is then arranged on the outside of the bush 25, and it can be locked to the bush with aid of a stop screw 28 or the like. In the annular gap space formed between the two O-rings 27, the inner envelope surface of the pedal roller 4 and the outer envelope surface of the bush 25, is introduced a volume of oil filling up said space. Due to this measure the pedal roller will get a sufficient damping effect for eliminating bounces of the above mentioned type without the need of maintaining the unintended braking effect of the hydraulic brake.

The invention thus provides a railway car retarder, which despite its simple basic structure has properties fully comparable to those of hydraulic braking units, at the same time as certain evident advantages are at hand as compared to these older hydraulic brakes, not least regarding weight, price and possibilities of inspection and service also at the place of use.

The braking action of the brake is directly dependent of an adjustment force, which can be generated by a pneumatic cylinder. By avacuating the air pressure it is possible very swiftly to put out the braking function of the retarder in order to allow e.g. unbraked passage of a locomotive, which is not possible at known hydraulic brakes, which must thereby be folded away, which is a complication. The lever of the actuating member must after it has been pressed down by a passing car be raised again in order to be ready to perform the braking, and this can be achieved by aid of return springs or the like, but it is also possible to use a pneumatic cylinder which is supplied with pressurized air from the same source as that generating the adjusting power in order to maintain the pedal in upright position. In this case it is also gained that the braking pedal is folded down if the air supply to the brake is cut off.

Claims

1. A railway car retarder for shunting purposes of the type using a mechanical friction brake and constituting a unit, one or more of which are anchored along a railway track, said unit being provided with an actuating member (3, 4) connected to a pivotable substantially horizontal shaft (5), said member, when contacted by wheels of passing railway cars, being adapted to exert a retarding effect on said wheels provided the car passes in the intended braking direction, characterized in that the said substantially horizontal shaft (5) is provided with a speed dependent freewheel coupling (7, 8, 9, 10) connected to the hub of a braking device (14, 15, 16; 17, 18, 19) in such a manner that the shaft is coupled to the braking device if a car passes in the intended braking direction at a speed exceeding an adjustable value, individually pre-set for each retarder unit, whereas coupling fails to occur if the car has a lower speed or passes in the opposite direction.

2. A railway car retarder as claimed in claim 1, characterized therein that the member (10) exerting a braking moment on the shaft (5) is adapted to be retarded by actuation of an adjustable outer actuation force (Fa), whereby the adjustable part (16; 18) of the brake is adjustably suspended and arranged to receive the actuation force in such a manner that the braking force (Fo) to a suitable portion counter-acts the actuation movement, whereby the resulting braking force will have mainly the desired value independent of variations in friction conditions.

3. A railway car retarder as claimed in claim 2, characterized therein that the actuation force (Fa) is provided by a pneumatic cylinder (20).

4. A railway car retarder as claimed in any one of claims 1 to 3, characterized therein that the

actuating member is a lever (3), which in initial position is directed mainly vertically upwards, above the upper edge of the rail, whereas it at wheel passage is pushed down to a mainly horizontal position thereby producing a corresponding rotation of the shaft, the lever being biased thereupon in order to automatically resume its initial position.

5. A railway car retarder as claimed in claim 2 provided with braking means comprising a rotating disc (14) which is squeezed axially between a fixed (15) and an adjustable disc (16), characterized therein that the adjusting movement is guided by rolling bodies (23) arranged between the adjustable disc (16) and a fixed base in such a manner that axial adjusting is effected if the adjustable disc (16) is rotated in a predetermined direction about the brake shaft, whereby the rolling bodies (23) by aid of resilient members (24) are permanently maintained in contact with the adjustable disc (16) and with the base, irrespective of in which direction the adjustable disc (16) is rotated.

6. A railway car retarder as claimed in claim 1, characterized therein that the locking member (9) of the freewheel coupling (7, 8, 9, 10) is adapted in normal position to be prevented from entering into locking position by means of retainer means (8), whereas a sufficiently big angular acceleration of the shaft (5) relative to the masses of the retainer (8), the locking members (9) and the biasing force, entails a sufficient displacement of the retainer for moving the locking members (9) to locking position.

7. A railway car retarder as claimed in claim 6, characterized therein that the retainer is a spring-biased rolling body retainer (8).

Revendications

1. Dispositif ralentisseur pour le triage de wagons ferroviaires, du type utilisant un frein à friction mécanique et constituant un ensemble, un ou plusieurs de ces ensembles étant ancrés le long d'une voie ferrée, ledit ensemble étant muni d'un organe de manoeuvre (3, 4) relié à un arbre pivotant sensiblement horizontal (5), ledit organe étant agencé pour exercer, lorsqu'il est rencontré par les roues de wagons ferroviaires en cours de passage, un effet ralentisseur sur lesdites roues, pourvu que le wagon passe dans le sens de freinage voulu, caractérisé en ce que ledit arbre sensiblement horizontal (5) est muni d'un accouplement à roue libre fonction de la vitesse (7, 8, 9, 10) relié au moyeu d'un dispositif de freinage (14, 15, 16; 17, 18, 19) de manière telle que l'arbre se trouve accouplé au dispositif de freinage si un wagon passe dans le sens de freinage voulu à une vitesse dépassant une valeur réglable, préfixée individuellement pour chaque ensemble ralentisseur, tandis que l'accouplement n'a pas lieu si le wagon a une vitesse inférieure ou passe dans le sens opposé.

2. Dispositif ralentisseur selon la revendication 1, caractérisé en ce que l'organe (10) exerçant un moment de freinage sur l'arbre (5) est agencé pour être ralenti par l'action d'une force de manoeuvre extérieure réglable (Fa), de sorte que la partie réglable (16; 18) du frein est suspendue de manière réglable et agencée pour recevoir la force de manoeuvre de manière telle que la force de freinage (Fo) contrecarre dans une mesure convenable le mouvement de monoeuvre, de façon que la force de freinage résultante ait sensiblement la valeur souhaitée indépendamment de variations des conditions de frottement.

3. Dispositif ralentisseur selon la revendication 2, caractérisé en ce que la force de manoeuvre (Fa) est fournie par un vérin pneumatique (20).

4. Dispositif ralentisseur selon l'une quelconque des revendications 1 à 3, caractérisé en ce que l'organe de manoeuvre est un levier (3), qui, en position initiale, est dirigé à peu près verticalement, au-dessus du bord supérieur du rail, tandis qu'au passage d'une roue il est repoussé vers le bas jusqu'en une position sensiblement horizontale provoquant par là une rotation correspondante de l'arbre, le levier étant sollicité afin de reprendre ensuite automatiquement sa position initiale.

5. Dispositif ralentisseur selon la revendication 2 muni de moyens de freinage comprenant un disque rotatif (14) enserré axialement entre des disques fixe (15) et réglable (16), caractérisé en ce que le mouvement de réglage est guidé par des corps roulants (23) disposés entre le disque réglable (16) et une base fixe en sorte qu'un réglage axial ait lieu si le disque réglable (16) est déplacé angulairement dans un sens déterminé autour de l'arbre de frein, de sorte que les corps roulants (23) sont maintenus en permanence à l'aide d'organes élastiques (24) en contact avec le disque réglable (16) et avec la base, quel que soit le sens dans lequel tourne le disque réglable (16).

6. Dispositif ralentisseur selon la revendication 1, caractérisé en ce que l'élément de verrouillage (9) de l'accouplement à roue libre (7, 8, 9, 10) est agencé en position normale pour que son passage en position de verrouillage soit empêché par un moyen de retenue (8), tandis qu'une accélération angulaire suffisamment importante de l'arbre (5) par rapport aux masses du moyen de retenue (8), des éléments de verrouillage (9) et à la force de sollicitation provoque un déplacement suffisant du moyen de retenue pour amener les éléments de verrouillage (9) en position de verrouillage.

7. Dispositif ralentisseur selon la revendication 6, caractérisé en ce que le moyen de retenue est une cage de corps roulants sollicitée par ressort (8).

Patentansprüche

1. Verzögerungsvorrichtung zum Rangieren von Eisenbahnwagen der Bauform, die eine mechanische Reibungsbremse verwendet und eine Einheit bildet, von der eine oder mehrere entlang eines Geleises verankert sind, welche Einheit ein Betätigungsglied (3, 4) aufweist, das mit einer

schwenkbaren, im wesentlichen horizontalen Welle (5) verbunden ist, welches Glied derart ausgebildet ist, dass, wenn Räder vorbeirollender Eisenbahnwagen zur Anlage an dasselbe kommen, das Glied auf die Räder dann eine Verzögerungswirkung ausübt, wenn der Wagen in der beabsichtigten Bremsrichtung rollt, dadurch gekennzeichnet, dass die im wesentlichen horizontale Welle (5) mit einer geschwindigkeitsabhängigen Freilaufkupplung (7, 8, 9, 10) ausgerüstet ist, die derart mit der Nabe einer Bremsvorrichtung (14, 15, 16, 17, 18, 19) verbunden ist, dass die Welle dann an die Bremsvorrichtung angekuppelt word, wenn ein Wagen in der beabsichtigten Bremsvorrichtung mit einer einen einstellbaren Wert übersteigenden Geschwindigkeit fährt, welcher Wert für jede Verzögerungseinheit einzeln festgelegt ist, und dass kein Ankuppeln stattfindet, wenn der Wagen eine kleinere Geschwindigkeit aufweist oder in der entgegengesetzten Richtung rollt.

2. Verzögerungsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass das Glied (10), das auf die Welle (5) ein Bremsmoment ausübt, derart ausgebildet ist, dass es durch Betätigung einer äusseren einstellbaren Betätigungskraft (Fa) verzögerbar ist, wobei der verstellbare Teil (16, 18) der Bremse verstellbar aufgehängt ist und derart angeordnet ist, dass er die Betätigungskraft derart aufnimmt, dass die Bremskraft (Fo) bis zu einem zweckdienlichen Teil gegen die Betätigungsbewegung wirkt, so dass die sich daraus ergebende Bremskraft hauptsächlich den erwünschten Wert unabhängig von Aenderungen der Reibungszustände hat.

3. Verzögerungsvorrichtung nach Anspruch 2, dadurch gekennzeichnet, dass die Betätigungskraft (Fa) durch einen pneumatischen Zylinder erzeugt wird.

4. Verzögerungsvorrichtung nach einem der Ansprüche 1—3, dadurch gekennzeichnet, dass das Betätigungsglied ein Hebel (3) ist, der in einer ersten Stellung im wesentlichen vertikal aufwärts und über den oberen Rand der Schiene gerichtet ist, so dass er anlässlich einem Vorbeirollen eines Rades nach unten in eine im wesentlichen horizontale Stellung gedrückt wird, wobei das entsprechende Drehen der Welle erzeugt wird, wobei der Hebel darauf vorgespannt ist, um automatisch seine erste Stellung einzunehmen.

5. Verzögerungsvorrichtung nach Anspruch 2 mit einer Bremsvorrichtung, die eine drehende Scheibe (14) aufweist, die axial zwischen einer feststehenden (15) und einer verstellbaren Scheibe (16) geklemmt ist, dadurch gekennzeichnet, dass die Verstellbewegung durch Wälzkörper (23) geführt ist, die zwischen der verstellbaren Scheibe (16) und einer feststehenden Basis derart angeordnet sind, dass das axiale Verstellen dann ausgeführt wird, wenn die verstellbare Scheibe (16) in einer festgelegten Richtung um die Bremsquelle rotiert wird, wobei die Wälzkörper (23) mittels nachgiebiger Glieder (24) dauernd in Berührung mit der verstellbaren Scheibe (16) und der Basis unabhängig davon gehalten werden, in welcher Richtung die verstellbare Scheibe (16) rotiert wird.

6. Verzögerungsvorrichtung nach Anspruch 1, dadurch gekennzeichnet, dass das Arretierglied (9) der Freilaufkupplung (7, 8, 9, 10) derart ausgebildet ist, dass es in seiner Normalstellung an einem Eintreten in die Sperrstellung mittels der Zurückhaltemittel (8) gehindert ist, wobei eine genügend grosse Winkelbeschleunigung der Welle (5) relativ zu den Masssen der Zurückhaltemittel (8), Arretierglieder (9) und der Vorspannkraft dem Zurückhalter eine genügend grosse Verschiebung erteilt, dass die Arretierglieder (9) in der Arretierstellung bewegt werden.

7. Verzögerungsvorrichtung nach Anspruch 6, dadurch gekennzeichnet, dass der Zurückhalter ein federvorgespannter Wälzkörperzurückhalter (8) ist.

FIG. 1

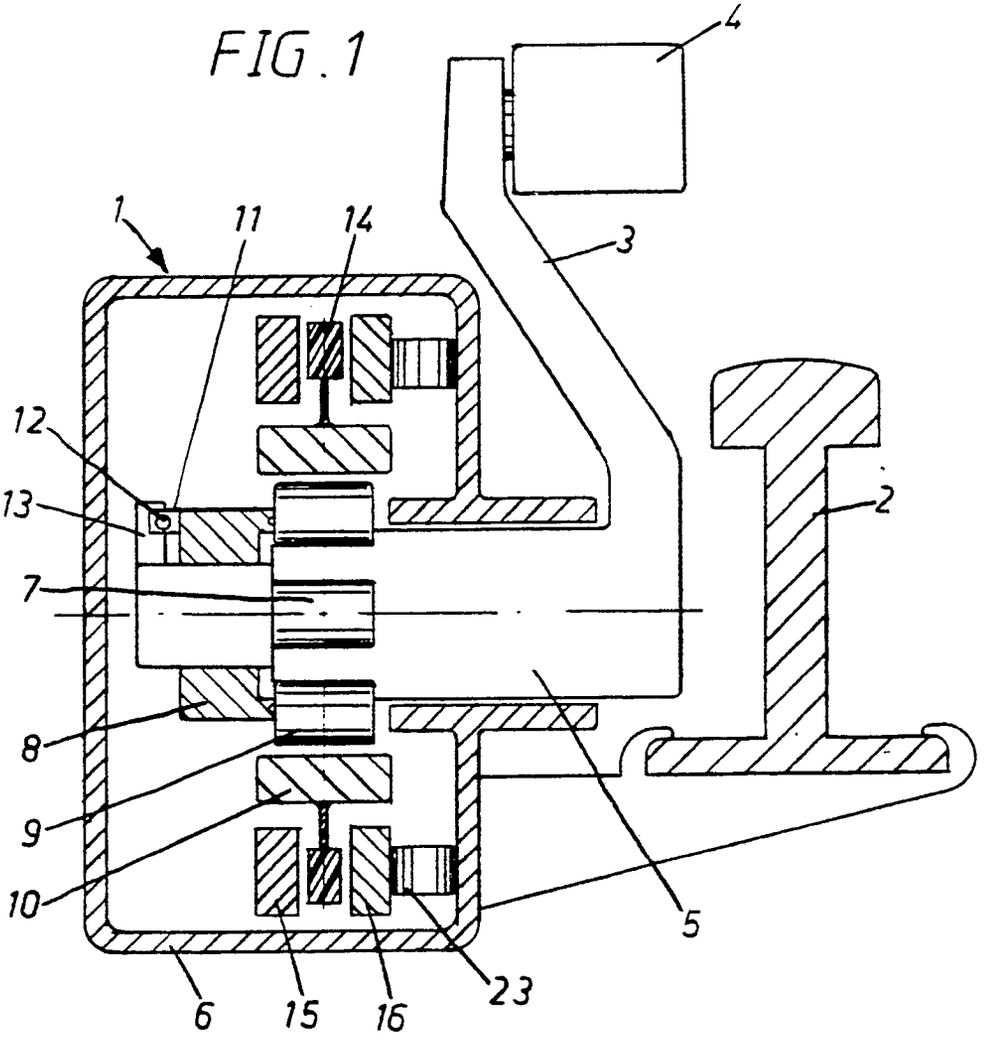

FIG. 2

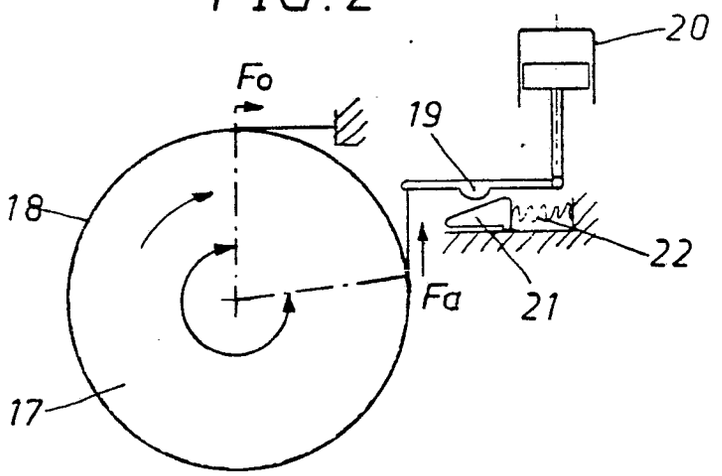

FIG.3

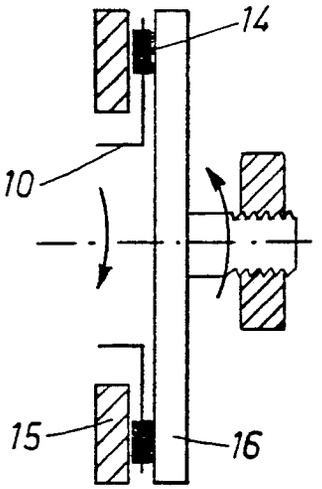

FIG.4

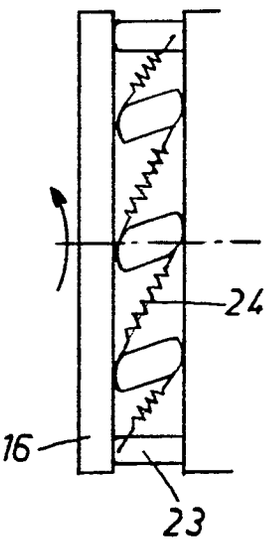

FIG.5