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(54) **GATE ASSEMBLY WITH AUTOMATIC OPENING AND CLOSING MECHANISM.**

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Gate assembly with automatic opening and closing mechanism

The present invention relates to a gate assembly having a vertical gate pole, a gate pivotable about and vertically displaceable along said pole, and a mechanism for automatically opening and closing the gate comprising a gate-supporting roller which rests on a stationary cam track having a lowermost point which determines a rest position of the gate corresponding to the closed position thereof, said track climbing on at least one side of said point in order that the gate when swung from the closed position shall be returned by gravity to the closed position by the support roller rolling down the cam track, an abutment which is movable between a position obstructing the path of the support roller along the cam track, in which position it allows movement of the support roller over the abutment in a direction away from the rest position but prevents the support roller from returning to the rest position, and another position in which the abutment to a major part is removed from the path of the support roller in order to allow the support roller to return along the cam track to the rest position.

GB—A—481,285 describes a gate assembly of the type referred to wherein the gate is swung to opened position by being pushed out of the way by a vehicle which presses against the gate, and then automatically swings back to the closed position thereof when the vehicle has passed through the gate opening. In this prior art gate assembly the abutment comprises a pivoted cam. During the opening movement of the gate the roller moves onto the cam from one side of the pivot axis thereof and then the cam pivots when the gate is substantially in a 45° position to allow the roller to move downwards along the cam at the other side of the pivot axis, the gate thereby moving to opened position. Then, the gate returns to the closed position, the abutment being displaced from the path of the roller.

A drawback of this prior art gate is that it returns too rapidly to the closed position thereof so that there is a risk that the vehicle passing through the gate opening rubs the side against the gate whereby the gate can get caught on the vehicle or can cause damage thereon.

For the purpose of eliminating this drawback and providing a gate with delayed return in order that the gate shall remain in the opened position during the time necessary for the vehicle to pass through the gate opening, the invention provides a gate assembly of the type referred to above with the characteristics appearing from claim 1.

In order to illustrate the invention this will be described in more detail below with reference to the accompanying drawing in which

Fig. 1 is a side view of a gate arranged according to the invention, and

Fig. 2 is an enlarged perspective view of the arrangement according to the invention.

The gate of Fig. 1 comprises a tube construction 10 which is journaled by means of a vertical tube 11 on a gate pole 12. The gate has vertical tubes 13 suitably spaced in order that a vehicle which moves towards the gate shall hit the gate with the bumper thereof at these tubes and push the gate out of the way from the closed position thereof when the vehicle is moving through the gate opening.

As will be seen from Fig. 2, the gate tube 11 is journaled on the tubular gate pole 12 by means of bushings 14 which can be provided at top and bottom in the tube 11 and possibly at one or more positions therebetween. The gate tube 11 is not only pivotable but also displaceable vertically on the gate pole 12, and one or more grease fittings 15 are provided for lubricating the bearings between the gate tube and the gate pole so that the gate tube runs easily on the gate pole. At the top, the gate tube 11 is closed by a cover 16 which can be secured by means of a lock bolt 17 or the like.

On the inner side of the gate tube 11 there is pivotally mounted a support roller 18 formed as a ball bearing roller with a trunnion 19 secured by a screw connection 20 to the gate tube. The screw connection is covered externally by a metal sheet casing 21. The support roller 18 is received by an opening 22 in the gate pole 12, and the lower edge of this opening forms a cam track 23 climbing progressively in the direction of the arrow 24 from the position of the support roller 18, shown to the right in Fig. 2. Said position of the support roller 18 corresponds to the closed position of the gate 10.

Inside the gate pole a tubular element 25 is mounted for axial displacement, and this element is non-rotatably guided by means of an axially extending rib 26 fixedly arranged inside the gate pole 12. By means of a bracket 27 having a socket 28 at the outer end thereof the element 25 is secured to the piston rod 29 of a hydraulic ram 30 by means of a screw connection 31, and the ram 30 is connected at the upper end thereof to a ring or plate 32 which in turn is secured to the gate pole 12 by means of a screw connection 33. The hydraulic ram 30 is of the type (shock absorber) having a spring which biases the piston of the hydraulic ram in one direction which is assumed to correspond in the present case to displacement of the piston rod 29 in upward direction. Furthermore, the piston of the hydraulic ram 30 has a valve controlled connection between the cylinder spaces filled with hydraulic fluid on each side of the piston, said connection being of the kind allowing fluid to pass between the opposite sides of the piston when the piston is displaced upwardly under the bias of the spring while the flow of the fluid is choked when the piston is

displaced downwardly in the cylinder against the bias of the spring.

The element 25 forms a crest 34 having a gently sloping ramp 35 and a steeper ramp 36, and under the bias of the spring in the hydraulic ram 30 this crest is located in the path of the support roller 18 along the cam track 23 as is shown in Fig. 2, the crest 34 projecting upwardly from the cam track 23 as a nose. The crest is kept in this position by the spring and it can be depressed from said position by a slow motion only against the bias of the spring because the choked flow of hydraulic fluid between the opposite sides of the piston retards such depression. The piston has a stroke which is large enough for the crest to be depressed sufficiently to a position wherein it is flush with the cam track 23, or at least to a position wherein the crest projects slightly from this cam track. However, when the pressure against the crest 34 is relieved, the crest will rapidly return to the position shown under the bias of the spring in the hydraulic ram 30 because the fluid can then pass rapidly from one side of the piston to the other side thereof.

If the gate is swung towards opened position according to the arrow in Fig. 1 by a vehicle being driven against the gate and pushing this out of the way, this means that the support roller 18 rolls in the direction of the arrow 24, the roller being lifted from the cam track 23 when it is rolling up the ramp 36 on the crest 34 in order to roll thereafter onto the cam track 23 again along the ramp 35. During this movement the gate is thus lifted, the gate tube 11 being displaced vertically on the gate pole 12, and since the oil in the hydraulic ram 30 by the choking action in the valve controlled opening in the piston retards the movement downwards of the crest 34, this crest will not be depressed when the support roller 18 is moving over same. Some small depression may of course occur at the passage of the roller but it is of no significance. The support roller 18 will be caught by the crest 34 at the side of the crest where the ramp 35 is provided, and will now be in the position 18' as indicated by dash and dot lines, in which the gate is fully opened and thus is swung substantially 90° or preferably more than 90° from the position shown in Fig. 1. Having passed the top of the crest 34 the support roller 18 will roll down the ramp 35 under the weight of the gate so that the gate as a consequence thereof will be swung automatically to opened position without the vehicle pushing against the gate. This automatic swinging can begin in a 45° to 60° position of the gate. Resting against the cam track 23 and against the ramp 35 the support roller 18 will cause a pressure against the crest 34 in the position 18', said pressure being dependent on the weight of the gate, and the crest will then move slowly downwards against the bias of the spring provided in the ram 30, as allowed by the flow of hydraulic fluid between the two sides of

the piston through the choked opening therein. Eventually, the crest 34 will reach a position in which the support roller 18 can roll along the cam track 23 back to the position shown by solid lines in Fig. 2. By adapting the choking in the piston and the inclination angles of the cam track 23 and the ramp 36 in a suitable way in relation to the weight of the gate it is possible to adapt, as desired, the time it takes for the gate to depress the crest 34 when the gate is in the opened position in order that the gate shall then be able to swing to the closed position thereof. As soon as the support roller 18 has passed the depressed crest 34 when the gate is moving from opened position to closed position the spring of the hydraulic ram 30 will rapidly press the crest 34 upwards to the position shown because such movement is not prevented to a significant extent by the fluid in the hydraulic ram. Then the gate is ready to be opened again in the manner described.

Thus, it will be seen that by the arrangement according to the invention the gate will be swung automatically to the opened position when such movement has been initiated by a vehicle moving against the gate and pushing it out of the way, and the gate will also be securely retained in the opened position thereof in order that the gate shall return after a delay to the closed position thereof. Moreover, it is possible to adapt the delay in such a manner that the gate will be maintained in the opened position long enough for a vehicle of maximum length to pass through the gate opening at a low speed.

As described above, the arrangement allows the gate to be swung towards one side only, but of course it is possible to provide the element 25 with two diametrically opposite crests 34 and to make the opening 22 in the gate pole sufficiently large so that the gate can be swung towards one side or the other from a rest position in which the gate is closed and will be retained for delayed return independently of the gate being swung towards one side or the other. The same element 25 and the same hydraulic ram 30 can control the delay towards both sides.

The invention is not, of course, limited to the embodiment shown but can be designed in other ways within the scope of the accompanying claims. This is true e.g. for the arrangement of the hydraulic ram 30 which is shown in a suspended position but can be arranged also in a standing position inside the gate pole 12. It is also possible to let the ram 30 move together with the element 25 while the piston rod 29 is fixedly secured to the gate pole 12. Moreover, the element 25 can be arranged in different ways but the tubular embodiment shown herein would be preferred considering that the element thereby can be guided in a relatively simple manner. The spring can be arranged outside the cylinder instead of being located inside the cylinder as has been said to be the

case in the embodiment shown.

Claims

1. A gate assembly having a vertical gate pole (12), a gate (10) pivotable about and vertically displaceable along said pole, and a mechanism for automatically opening and closing the gate comprising a gate-supporting roller (18) which rests on a stationary cam track (23) having a lowermost point which determines a rest position of the gate corresponding to the closed position thereof, said track climbing on at least one side of said point in order that the gate when swung from the closed position shall be returned by gravity to the closed position by the support roller rolling down the cam track, an abutment (34) which is movable between a position obstructing the path of the support roller (18) along the cam track (23), in which position it allows movement of the support roller over the abutment (34) in a direction away from the rest position but prevents the support roller from returning to the rest position, and another position in which the abutment to a major part is removed from the path of the support roller (18) in order to allow the support roller to return along the cam track (23) to the rest position, characterised by spring means having a damper (30) allowing the abutment (34) to be slowly removed from the path of the support roller (18) along the cam track (23) against the spring bias under the pressure of the support roller (18) against the abutment and to be rapidly returned by the spring bias to the position in which it obstructs the path of the support roller along the cam track when the roller has passed the abutment.

2. A gate assembly according to claim 1, characterised in that the abutment is formed as a crest (34) having a gently sloping ramp (35) facing away from the rest position, and a steep ramp (36) facing the rest position.

3. A gate assembly according to claim 1 or 2, characterised in that the damper of the spring means comprises a hydraulic ram (30) having a check valve controlled passage between the two sides of the piston allowing rapid flow of hydraulic fluid between the cylinder spaces on opposite sides of the piston in one direction corresponding to the return of the abutment (34) under the spring bias, and slow flow of hydraulic fluid in the other direction corresponding to the depression of the abutment under the pressure of the support roller (18) against the abutment.

4. A gate assembly according to any of claims 1 to 3, characterised in that the gate pole (12) is tubular and the cam track (23) is formed by the edge of an opening (22) in the gate pole (12).

5. A gate assembly according to claim 4, characterised in that the abutment (34) is formed by a tubular element (25) guided for axial displacement in the tubular gate pole (12).

6. A gate assembly according to any of claims 1 to 5, characterised in that one part of the hydraulic ram (30), the cylinder or the piston, is fixedly connected to the gate pole (12), the other part being connected to the abutment (34).

Patentansprüche

1. Toranordnung mit einem vertikalen Torpfosten (12), einem um den Pfosten schwenkbaren und dem Pfosten entlang vertikal verstellbaren Tor (10) und einem Mechanismus zum automatischen Öffnen und Schliessen des Tores, bestehend aus einer das Tor tragenden Rolle (18), die an einer ortsfesten Nockenbahn (23) anliegt, welche Nockenbahn einen Tiefpunkt hat, der eine der Schliesslage des Tores entsprechende Ruhelage bestimmt, und nach wenigstens einer Seite des genannten Punktes ansteigt, damit das Tor, wenn es aus der Schliesslage geschwenkt ist, durch die Schwerkraft zur Schliesslage dadurch zurückgestellt werden soll, dass die Tragrolle auf der Nockenbahn abläuft, und einem Anschlag (34), der zwischen zwei Lagen verschiebbar ist, und zwar einer den Weg der Tragrolle (18) der Nockenbahn (23) entlang versperrenden Lage, in welcher der Anschlag die Bewegung der Tragrolle über den Anschlag (34) von der Ruhelage weg zulässt aber den Rückgang der Tragrolle an die Ruhelage verhindert, und einer anderen Lage, in welcher der Anschlag grösstenteils aus der Bahn der Tragrolle (18) entfernt ist, um den Rückgang der Tragrolle an die Ruhelage der Nockenbahn (23) entlang zuzulassen, gekennzeichnet durch eine Federeinrichtung mit einem Dämpfer (30), der durch den Druck der Tragrolle (18) gegen den Anschlag eine langsame Wegführung des Anschlags (34) aus dem Weg der Tragrolle (18) der Nockenbahn (23) entlang gegen die Federbelastung zulässt und, wenn die Rolle den Anschlag passiert hat, eine schnelle Rückstellung des Anschlags durch die Federbelastung in die Lage, in welcher der Anschlag den Weg der Tragrolle der Nockenbahn entlang versperrt, zulässt.

2. Toranordnung nach Anspruch 1, dadurch gekennzeichnet, dass der Anschlag als ein Kamm (34) mit einer von der Ruhelage weggekehrten sanft abfallenden Rampe (35) und einer der Ruhelage zugekehrten steilen Rampe (36) geformt ist.

3. Toranordnung nach Anspruch 1 oder 2, dadurch gekennzeichnet, dass der Dämpfer der Federeinrichtung aus einer hydraulischen Pressvorrichtung (30) besteht, der eine von einem Rückschlagventil regulierten Durchgang zwischen den beiden Seiten des Kolbens hat, welche einen starken Strom der hydraulischen Flüssigkeit zwischen den zu entgegengesetzten Seiten des Kolbens liegenden Zylinderräumen in der einen Richtung, die der Rückstellung des Anschlags (34) durch die Federbelastung entspricht, und einen schwachen Strom in der

anderen Richtung, die dem Herunterdrücken des Anschlags durch den Druck der Tragrolle (18) gegen den Anschlag entspricht, zulässt.

4. Toranordnung nach einem der Ansprüche 1 bis 3, dadurch gekennzeichnet, dass der Torpfosten (12) rohrförmig ist und dass die Nockenbahn (23) vom Rand eine Öffnung (22) im Torpfosten (12) gebildet ist.

5. Toranordnung nach Anspruch 4, dadurch gekennzeichnet, dass der Anschlag (34) durch ein rohrförmiges Element (25) gebildet ist, das axial verschiebbar im rohrförmigen Torpfosten (12) geführt ist.

6. Toranordnung nach einem der Ansprüche 1 bis 5, dadurch gekennzeichnet, dass ein Teil der hydraulischen Pressvorrichtung (30), der Zylinder oder der Kolben, mit dem Torpfosten (12) fest verbunden ist, weil der andere Teil mit dem Anschlag (34) verbunden ist.

Revendications

1. Ensemble à barrière comportant un montant vertical (12), une barrière (10) qui peut pivoter et se déplacer verticalement sur ledit montant, et un mécanisme pour ouvrir et fermer automatiquement la barrière comprenant un galet (18) de support de la barrière qui repose sur une piste de came fixe (23) dont le point le plus bas détermine une position de repos de la barrière correspondant à sa position fermée, ladite piste s'élevant sur au moins un côté dudit point afin que la barrière, après qu'elle a pivoté à partir de la position fermée, soit ramenée par gravité vers la position fermée par le galet d'appui qui descend en roulant sur la piste de came, une butée (34) qui est mobile entre une position faisant obstacle à la course du galet (18) d'appui le long de la piste (23) de came, position dans laquelle elle permet un mouvement du galet d'appui au-dessus de la butée (34) dans un sens s'éloignant de la position de repos, mais empêche le galet d'appui de revenir vers la position de repos, et une autre position dans laquelle la butée est retirée en grande partie de la course du galet (18) d'appui afin de permettre au galet d'appui de revenir le long de

la piste (23) de came vers la position de repos, caractérisé par un moyen à ressort comportant un amortisseur (30) qui permet à la butée (34) d'être éloignée lentement de la course du galet (18) d'appui le long de la piste (23) de came contre la force d'un ressort, sous la pression du galet (18) d'appui contre la butée, et d'être ramenée rapidement par la force du ressort vers la position dans laquelle elle fait obstacle à la course du galet d'appui le long de la piste de came lorsque le galet a dépassé la butée.

2. Ensemble à barrière selon la revendication 1, caractérisé en ce que la butée se présente sous la forme d'une crête (34) qui présente une rampe (35) légèrement inclinée s'éloignant de la position de repos et une rampe raide (36) tournée vers la position de repos.

3. Ensemble à barrière selon la revendication 1 ou 2, caractérisé en ce que l'amortisseur du moyen à ressort comprend un vérin hydraulique (30) comportant un conduit commandé par un clapet de retenue entre les deux côtés du piston, permettant un écoulement rapide du fluide hydraulique entre les espaces du cylindre situés sur les côtés opposés du piston, dans un sens correspondant au retour de la butée (34) sous la force du ressort, et un écoulement lent du fluide hydraulique dans l'autre sens correspondant à l'enfoncement de la butée sous la pression du galet (18) d'appui contre cette butée.

4. Ensemble à barrière selon l'une quelconque des revendications 1 à 3, caractérisé en ce que le montant (12) de la barrière est tubulaire et la piste (23) de came est formée par le bord d'une ouverture (22) ménagée dans le montant (12) de la barrière.

5. Ensemble à barrière selon la revendication 4, caractérisé en ce que la butée (34) est formée par un élément tubulaire (25) guidé de manière à pouvoir se déplacer axialement dans le montant tubulaire (12) de la barrière.

6. Ensemble à barrière selon l'une quelconque des revendications 1 à 5, caractérisé en ce qu'une partie du vérin hydraulique (30), le cylindre ou le piston, est fixée au montant (12) de la barrière, l'autre partie étant reliée à la butée (34).

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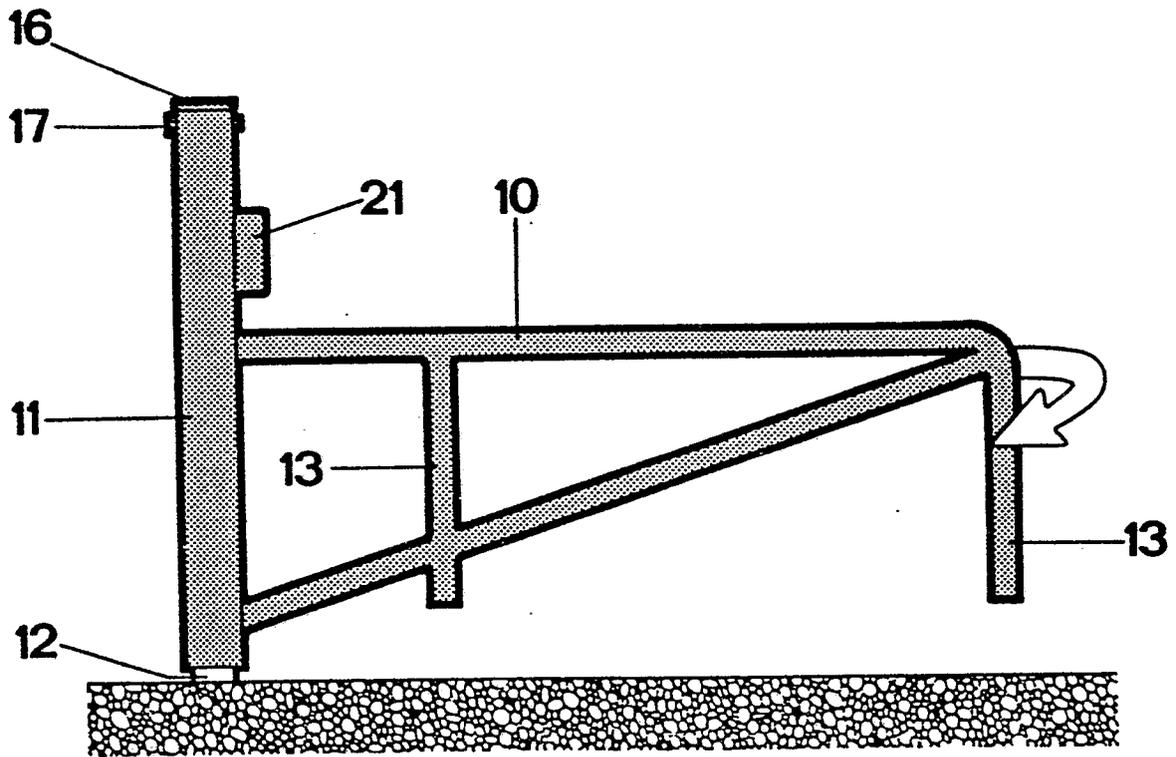


FIG. 1

