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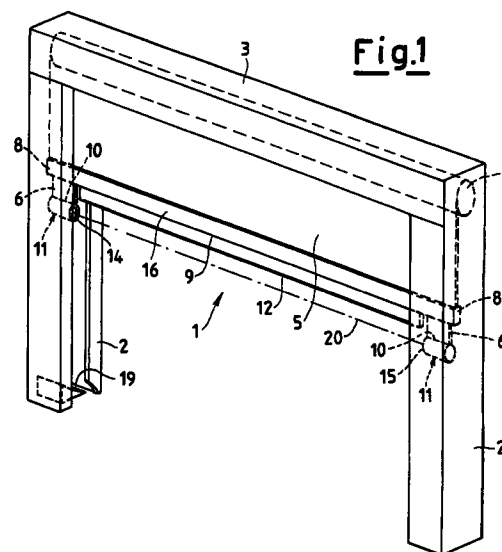
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(54) **Fast drive rolling gate, in particular for industrial premises**

(57) In order to avoid, automatically, that the rolling gate (1) bumps into someone or something while they pass through the gate opening and to realise said rolling gate (1) in such a way that it has a simple, reliable and inexpensive structure, photoelectric cells (14, 15), which detect the presence of someone or something passing through the gate, are positioned at the ends of the folding arms (6) and they are positioned at a distance, from the lower edge (9) of the rolling gate (1), which is defined in function of the closing speed of the gate (1).



EP 0 875 655 A2

Description

The present invention refers to a fast drive rolling gate, in particular for the use in gate openings of industrial premises. Said rolling gates, which are known, for instance, from the following documents: US-A-4,997,022; DE-A-33 45 016; EP-A-O 276 045, have been mainly designed to achieve simultaneously two purposes, i.e. to allow a high number of transits through the openings, in particular of industrial buildings, and to reduce the heat loss in winter or the heat introduction in summer. From a technical point of view, said purpose has been substantially reached by substituting the metal plates with a plastic material sheet and by providing the rolling gate with automatic control device which allow the fast opening and/or closing at every transit.

Automatic control device for rolling gates of said type are known, for example, from the following documents: EP-A-O 563192 and WO/92/11544 which are mentioned for reference. Notwithstanding the presence of said devices, there is still the danger that the rolling gate bumps into someone or something passing through the rolling gate opening while in operation, said danger is proportional to the closing speed of the rolling gate. It has to be understood that currently a fast drive rolling gate operates at speed which can exceed one meter per second.

In the case that the rolling gate bumps into someone or something passing through the opening, pneumatic or electric sensors are positioned on the lower edge of the rolling gate in order to stop and to reverse the motion of the rolling gate. Unfortunately, said devices, in order to work, have to get in contact with a certain impact force with the body passing through the rolling gate opening, afterwards the rolling gate does not stop immediately because of the inertial force which is proportional to the closing speed of the rolling gate and therefore it is significant. For this reason, currently, the closing speed of said rolling gate is purposely limited so as to avoid, in case of casual bumps, people from being hurt and goods from being damaged.

Unfortunately, the limitation of the drive speed of the rolling gate is disadvantageous when it is necessary to maintain constant inner climatic conditions. At any rate, when the rolling gate bumps into a transport vehicle, said rolling gate suffers damages since, due to the inertial force of both the rolling gate and the vehicle, the automobile proceeds in its motion through the rolling gate opening and the rolling gate continues its downward motion with all the possible consequences. In order to solve said problem, a rolling gate has been realised according to US-A-4,274,226 and, in particular, the fast drive rolling gate described in US-A-4,953,608.

In particular in US-A-4,953,608, the rolling gate has detecting means which control the stop of the rolling gate and which reverse the closing motion, said detecting means are mounted on two telescopic supporting arms which are positioned on the two opposite sides of

the rolling gate door and which are placed at a distance, from the lower edge of the rolling gate, sufficient to allow the rolling gate to stop and to reverse its motion in case that the beam emitted by said detecting means is interrupted by a body passing through the rolling gate opening. Such a structure, and in particular the presence of the telescopic arms, causes the realisation of a more complicated structure with the consequent increase in the manufacturing and maintenance costs which, instead, should be lowered in consideration of commercial reasons.

Therefore, the purpose of the present invention is to overcome said disadvantage and to provide a fast drive rolling gate, in particular for industrial premises, which shall, simultaneously, be able to:

- work automatically during closing and opening operations,
- avoid automatically the bumps against people and goods passing through the rolling gate opening,
- have a single and efficient structure in order to be more inexpensive and reliable than the presently known realisations.

Said purpose is achieved through a fast drive rolling gate, in particular for the opening of industrial premises, realised according to claim 1 which is taken as reference. The folding arms will make it possible to achieve the purposes of the invention since the detecting means will be conveniently spaced from the rolling gate lower edge without using telescopic arms which are usually more expensive and sensitive and are more frequently subject to malfunctions, especially in the case of the combined action of humidity and soil which are frequently found in the corners of the large industrial openings. The subsequent claims refer to embodiments even less expensive since the arms are realised using the same material of the rolling gate plastic sheet.

By way of a non limiting example, the invention is described with the help of the attached drawings which refer to an industrial rolling gate, even though said invention can be applied to door and/or window openings of civil buildings.

Figure 1 is a schematic perspective view of a rolling gate according to the invention.

Figure 2 is a detail of said rolling gate in the open position.

Figure 3 is a detail of said rolling gate in the closed position.

With reference to the above drawings, the fast rolling gate, generally indicated by numeral 1, is of type particularly suitable for the openings of industrial premises and in particular of sheds. Said rolling gate can possibly be used also for other building openings, for instance civil buildings. In such cases, the dimensions will suite, obviously, the openings existing in said buildings. The rolling gate 1 basically comprises: a couple of posts 2 connected at the top by a lintel 3 which

supports a driven winding roll 4 whereon a transparent or opaque sheet 5, preferably made of flexible material, can be wound. The sheet 5 has cross dimensions slightly larger than the distance between the posts and a height substantially equal to the distance between the winding roll 4 and the ground 13.

The elements 2-5 are not described in details since they can have the same structure of the corresponding elements described in the above mentioned preceding art.

The same consideration applied to elements 2-5 can be extended to the working and interaction operations. The rolling gate 1 further comprises a pair of folding arms 6 having the first ends 7 fixed to the two opposite sides 8 of the lower edge 9 of the sheet 5 and their second ends 10 which support the beam detecting means 11. The length of said arms 6 is such that:

- said beam detecting means 11 are spaced from the lower edge 9 of the sheet by a distance "d" directly proportional to the closing or descending speed of the rolling gate 1;
- said beam detecting means 11 are positioned on the same axis 20 in order to be connected through a beam.

The arms 6 can be folded in order to move away the beam detecting means 11 from the drive plane 21 of the rolling gate 1 when said rolling gate is closed with the lower edge 9 of the sheet 5 in contact with the ground 13 and thus having closed the opening of the rolling gate 1.

A weather strip 12 is preferably fixed to the lower edge 9 so that, when the rolling gate is in its closed position, it stops air and water from entering between the lower edge 9 and the ground 13. According to an important feature of the invention, the arms 6 can be folded (along arrows "F") in order to put the lower edge 9 of the sheet 5 in contact with the ground 13 so that the opening of the rolling gate 1 is closed also with the help of the weather strip 12, when said weather strip is provided.

Preferably, the detecting means 11 are formed by a beam emitting photoelectric cell 14 and by a beam receiving photoelectric cell 15. In alternative, the beam detecting means 11 could be of the laser beam type or of the photoelectric type which can operate even when the beam emitting photocell and the beam receiving photocell are not aligned. In a first embodiment the arms 6 are made of an elastic and flexible material (for instance of an elastomer material), and are fixed, for instance through a restrained joint, at the two opposite ends 8 of the lower edge 9 of the sheet 5, said arms support on the second ends 10 the beam emitting photocell 14 and the beam receiving photocell 15, respectively.

By making the arms 6 of an elastic and flexible material, for instance of rubber, said arms can be easily folded and, more important, they go readily back to their

working position in their straight and coplanar configuration, as soon as the lower edge 9 of the sheet is at a sufficient distance from the ground 13. In a second embodiment, the arms 6 are hinged and not fixed through a restrained joint at the two opposite ends 8 of the lower edge 9 of the sheet 5. In this case, the arms 6 could also be made of a rigid material. In such a way, independently of the material (rigid or elastic) the arms 6 are made of, thanks to the hinges, it is possible to increase their resistance to the folding stress (arrows "F") when they are in contact with the ground 13. In such case, the quick return to the working position can be obtained through the use of elastic means applied to the first ends 7 of each arm 6 or through the use of weights applied to the second ends 10 of each arm 6. The elastic means and the weights are not shown in order to simplify the matter. In order to further reduce the costs and to simplify the structure, the arms 6 are made of corresponding portions of the same sheet 5 that forms the rolling gate or of other flexible sheet. Also in this last configuration the alignment of the arms 6 can be obtained by putting a weight on the second end 10. In the example, the arms 6 have their first end 7 fixed to a rigid transverse bar 16 positioned on the lower edge 9 of the sheet 5. Preferably, the second ends 10 of the arms 6 are shaped to form housings 17 which allow the folding of portions of the sheet 5. Said housings 17 are suitable to receive the beam emitting photocell 14 and the beam receiving photocell 15, preferably said cells are cylindrical. In order to limit the damages caused by bumping against the ground or against other bodies, the photocells 14 and 15 are placed in said housings 17 together with means suitable to cushion the possible bumps. Said means could, for instance, be realised by a cover 18 made of a spongy material having occluded cells to avoid rain water and/or soil absorption.

In summary, the basic idea of the invention is substantially to provide arms 6 which can be folded in order to move away the detecting means 11 from the drive plane 21 of the rolling gate, when said rolling gate is in its closed position and, simultaneously, said detecting means have to be elastic enough to return to their initial configuration any time the rolling gate is opened in order to allow the proper operations of the beam type detecting means.

At any rate, the photocells 14 and 15 are parallel to the lower edge 9 of the rolling gate 1 so as to detect, through its beam, the presence of bodies along the closing path, before said body comes in contact with the rolling gate during its closing phase. When a body interrupts the beam, the closing (downward) motion of the rolling gate stops.

The inertial force can be completely absorbed while the rolling gate covers the distance "d" between the photocell beam and the lower edge 9 of the sheet 5, in order to stop the rolling gate before it comes in contact with the body detected by the photocell, or it can be absorbed partially by said distance and partially by the

lower edge 9 (if it is made of flexible material) of the rolling gate. In this case, the pair of photocells 14 and 15 can be positioned at a smaller distance from the edge 9. When the rolling gate reaches the ground 13 and has to make a sealing ccontact against the ground 9, the two photocells positioned at the ends of the arms 6 come first in contact with the ground 13 and they stop, while the central portion of the rolling gate 1 proceeds towards the ground 13 until said rolling gate, with the help of the weather strip 12 when said strip is provided, makes a sealing contact with the ground.

According to the invention, it is also possible to provide a pair of deflectors 19, positioned at the base of the corresponding posts 2. The photocells 14 and 15, while sliding on the curved or slanting surface of the corresponding deflector 19, are coaxial up to the end of the closing phase of the rolling gate and therefore they are coaxial also when they come in contact with the ground 13. In this way the beam detecting means 11 can maintain their working capability constantly and also during and after the last closing instants. The slanting planes of the deflectors 19 are oriented in such a way that they are able to push the photocells 14 and 15 both towards the outside and towards the inside. In both cases the use of the deflectors 19 allows the control of the opening and closing phases of the rolling gate up to and beyond the last instants of said operations, and thus clear advantages are achieved.

Claims

1. A fast drive rolling gate (1), in particular for openings in industrial and civil premises, comprising: a pair of posts (2) connected at the top by a lintel (3) which supports a driven roll (4) whereon a sheet (5) is wound, said sheet has a cross dimension at least equal to the distance between the posts (2) and height at least equal to the distance of the lintel (3) from the ground (13), a pair of arms (6) which have the first ends (7) fixed to the two opposite ends (8) of the lower edge (9) of the sheet (5) and the second ends (10) which support the beam type detecting means (11) wherein the length of said arms (6) is such that said beam type detecting means (11) are spaced from the lower edge (9) of the sheet (5) by a distance "d" directly proportional to the closing or descending speed of the rolling gate (1), characterised in that said arms (6) can be folded in order to move away the beam detecting means (11) from the sliding plane (21) of the rolling gate (1) when said rolling gate is closed so that the lower edge (9) of the sheet (5) is in contact with the ground (13) and closes the opening of the rolling gate (1).
2. A rolling gate according to claim 1, characterised by comprising a pair of deflectors (19) which are positioned at the base of the corresponding posts (2) and which are suitable to come in contact with the

beam detecting means (11) which, through a sliding movement on the curved or slanting surface of the corresponding deflector (19), are simultaneously moved away from the sliding plane (21) of the rolling gate (1) but they remain coaxial up to the end of the closing phase of the rolling gate and thus even when said detecting means (11) come in contact with the ground (13).

3. A rolling gate according to claim 2, characterised in that said deflectors (19) are oriented in such a way that the beam detecting means (11) are pushed either towards the outside or towards the inside.
4. A rolling gate according to claim 1, characterised in that said arms (6) are made of an elastic and flexible material.
5. A rolling gate according to claim 1, characterised in that said arms (6) are hinged to the lower edge (9) of the sheet (5).
6. A rolling gate according to claim 1, characterised in that said arms (6) are made of a soft material.
7. A rolling gate according to claim 6, characterised in that said arms (6) are made of portions of the sheet (5) and in that the arm second ends (10) are shaped in order to comprise housings (17) suitable to receive the beam type detecting means (11) which are photoelectric cells, i.e. a beam emitting photoelectric cell (14) and a beam receiving photoelectric cell (15), respectively.
8. A rolling gate according to claim 6, characterised in that said arms (6) are formed by corresponding portions of the same sheet (5) that forms the rolling gate (1), said portions have the first end (7) fixed to a rigid transverse bar (16) which is positioned at the lower end (9) of the sheet (5).
9. A rolling gate according to claim 8, characterised in that said detecting means (11) are located in said housings (17) together with means suitable to cushion any possible bumps.
10. A rolling gate according to claim 1, characterised in that said beam type detecting means (11) are of the laser type.
11. A rolling gate according to claim 5, characterised by comprising elastic means applied to the first ends (7) of each arm (6) for the quick return to the working position of said arms (6).
12. A rolling gate according to claim 5, characterised by comprising a weight positioned on the second ends (10) of each arm (6) for the quick return to the work-

ing position of said arms (6).

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