

DESCRIPTION

TITLE: Arm for automatic barrier

[001] The present invention relates to the field of automatic barriers for controlling the traffic of vehicles, in particular on traffic lanes or sites with controlled access such as parking
5 lots, private locations, highway lanes, official buildings, priority traffic lanes, etc. The present invention relates in particular to an arm for automatic barrier as well as to the automatic barrier comprising said arm.

[002] Barrier arms are subject to many requirements. They must be light in order to limit the forces of the drive motor. They must be resistant to impacts, especially to the
10 impacts of vehicles hitting the arm, without however causing the windshield to break. Carbon arms are already known, they are light and resistant, however these arms are very rigid and therefore brittle.

[003] One of the aims of the present invention is to overcome at least one of these disadvantages. To this end, the present invention provides an arm for an automatic barrier
15 for controlling the traffic of vehicles, in particular on traffic lanes or sites with controlled access, the arm comprising a plurality of substantially flat slats, held spaced apart, substantially opposite each other and each extending in a respective plane of extension, the planes of extension being substantially parallel to each other, the slats being configured
20 so as to permit an elastic deformation of the arm in a plane perpendicular to the planes of extension, between a closed position wherein the arm prohibits traffic and a deformed position wherein at least a portion of the arm is oblique with respect to the direction of traffic, and in particular wherein the at least one portion of the arm is perpendicular to the direction of traffic.

[004] Thus configured, the arm has elastic properties to that make it possible to absorb
25 the mechanical energy received during an impact, in particular with a moving vehicle. The ability of the arm to bend also makes it possible to prevent the recoil effect, i.e. the return movement of the arm when it returns to its original position.

[005] The configuration of the slats gives the arm an elastic deformation capacity which allows it, under the action of a force exerted against the arm, in particular in a direction
30 transverse to the planes of extension of the slats, to achieve a curvature of at least 90°, for example about 180°, or even an S-shaped curvature, to avoid breakage and then to return to the closed position.

[006] In concrete terms, when the automatic barrier for which the arm is intended, is mounted on a substantially horizontal surface, the arm thus configured is elastically deformable in a horizontal plane while remaining sufficiently rigid in a vertical plane so as to limit oscillations in this plane during the opening and closing of the arm.

5 [007] According to one arrangement, the arm comprises a spacer system, configured to attach in pairs all of the adjacent slats of the plurality of slats, keeping them spaced apart and substantially facing each other.

[008] For example, the spacer system comprises at least one spacer, extending longitudinally between two adjacent slats, in particular the at least one spacer extends over
10 at least 50% of the length of the arm.

[009] According to another possibility, the at least one spacer extends over at least 70% of the length of the arm.

[010] Advantageously, the at least one spacer comprises an elastomeric material.

[011] According to one arrangement, the spacer system comprises spacers spaced
15 between the adjacent slats and spaced along the arm. The spacers are for example made of a rigid material, by silent blocks, etc.

[012] According to one possibility, the at least one spacer comprises at least one first bearing surface in contact with a slat, and a second opposing bearing surface in contact with an adjacent slat, the first bearing surface being configured to generate at least one
20 curvature convex to the slat in contact with the first surface.

[013] Thus, when the arm comprises at least two spacers inserted between two adjacent slats, the slat portion bearing between two first surfaces has two convex curvatures. This creates a concave inflection point in the slat. This configuration facilitates the elastic deformation of the arm in a plane perpendicular to the planes of extension.

25 [014] According to one possibility, the first bearing surface has a concave curvature.

[015] According to another possibility, the first bearing surface comprises two opposing end regions, each extending in a plane transverse to the planes of extension, oriented toward the second bearing surface. This configuration makes it possible to generate at least one convex curvature with the slat in contact.

[016] According to an arrangement, the second bearing surface is configured to generate at least one convex curvature to the adjacent slat bearing on the second surface. Thus, when the arm comprises only two slats, the two adjacent slats symmetrically have a convex curvature at the bearing surfaces and a concave inflection point between the two convex curvatures.

[017] According to one alternative embodiment, the plurality of slats is comprised only of a central slat, a first lateral slat and a second lateral slat, adjacent to the central slat, the arm comprising at least two spacers on either side of the central slat.

[018] According to other characteristics, this alternative of the arm of the invention comprises one or more of the following optional characteristics considered alone or in combination:

- The central slat has a height that is more substantial than those of the first lateral slat and of the second lateral slat.
- The central slat has a length that is more substantial than those of the first lateral slat and of the second lateral slat.
- The central slat has a thickness that is more substantial than those of the first lateral slat and of the second lateral slat.
- The at least two spacers have the first bearing surface bearing on the first lateral slat and the second lateral slat respectively, and are configured to generate at least one convex curvature to the first lateral slat and the second lateral slat.

[019] According to another arrangement, the arm comprises at least one inflection part configured to generate a concave-shaped inflection point to at least one slat, independently of the conformation of the spacers. The at least one inflection part is, for example, arranged bearing against said slat, spaced from the at least one spacer, so as to apply a constraint generating a concave flexion of said slat.

[020] Alternatively, the at least one inflection part is for example arranged on two adjacent slats, spaced from the at least one spacer, so as to generate a bearing on the two adjacent slats constraining them to a concave flexion.

[021] According to one possibility, the arm comprises a tightening element configured to tighten the plurality of slats in a free end region of the slats, so as to decrease their stiffness. In the present document, the expression "free end region of the slats" means an end region opposite an end portion of the slats, said end portion being intended to be
 5 attached to the support device of the automatic barrier.

[022] According to one arrangement, the plurality of slats of the arm comprises a fibrous material, comprising in particular glass fibers, carbon fibers, aramid fibers, for example glass fibers in a resin matrix or poly(p-phenylene terephthalamide) otherwise known under the acronym PPD-T or the name Kevlar®.

10 [023] According to a second aspect, the invention provides an automatic barrier for controlling vehicle traffic, in particular on traffic lanes or sites with controlled access, the automatic barrier comprising:

- a support device configured to attach the automatic barrier to the ground,
- an arm such as described previously, the arm being mounted movable on the
 15 support device between a closed position wherein the arm prohibits access and an open position wherein the arm authorizes access.
- an actuation system configured to actuate arm movement between its closed position and its open position.

[024] According to one arrangement, the actuation system comprises a re-hinging
 20 device allowing the arm to be re-hinged after an impact. In this configuration, the automatic barrier has a flexible arm, which absorbs impacts and may be automatically returned to the closed position when a vehicle has struck and unhinged it.

[025] Other aspects, purposes and advantages of the present invention will appear better upon reading the following description of the different alternative embodiment thereof,
 25 given by way of non-limiting example and made in reference to the appended drawings. The figures do not necessarily correspond to the scale of all the elements shown in order to improve their legibility. In the remainder of the description, for the sake of simplification, identical, similar or equivalent elements of the different embodiments have the same numerical references to the figures and on which:

[026] [Fig. 1] shows a schematic perspective view of an automatic barrier comprising the arm according to one embodiment of the present invention.

[027] [Fig. 2] shows a schematic perspective view of the arm in deformed position according to the embodiment shown in Figure 1.

5 [028] [Fig. 3] shows a top view of the arm according to the second embodiment of the invention.

[029] [Fig. 4] shows a schematic perspective view of the arm according to an alternative embodiment of the invention.

[030] As shown in Figure 1, the automatic barrier 100 comprises a support device 1
 10 configured to attach the barrier 100 to the ground and an arm 200 according to the invention, movably mounted on the support device 1 between a closed position wherein the arm 200 prohibits traffic (the arm 200 extends substantially horizontally when the barrier is mounted on a horizontal ground) and an open position wherein the arm 200 permits traffic (not shown, the arm 200 extends substantially vertically when the barrier is mounted on a horizontal
 15 ground). The automatic barrier 100 further comprises an actuation system 2 configured to actuate the movement of the arm 200 between its two positions, via a connecting portion 3 connecting the arm 200 to the actuation system 2. According to a possibility not shown in the figures, the barrier 100 further comprises a re-hinging device allowing the arm 200 to be returned to the closed position.

20 [031] In accordance with the first embodiment shown in Figure 1, the arm 200 comprises two substantially flat slats 4, held spaced and substantially opposite each other by a spacer system. The spacer system is composed of several spacers 5 spaced along the arm 200. More precisely, the spacers 5 are spaced between the two adjacent slats 4 by attaching them each in a respective plane of extension and parallel to each other (the plane
 25 of extension is a substantially vertical plane when the barrier is mounted on a horizontal ground). This configuration of the slats 4 imparts flexibility to the arm 200 which may thus elastically deform in a plane perpendicular to the planes of extension of the slats 4. As shown in Figure 2, when the arm 200 is struck by a vehicle driving in a traffic lane (shown by the axis X), the arm 200 passes into a deformed position D wherein a portion of the arm
 30 200 is oblique with respect to the direction of traffic X. The arm 200 may be deformed up to a deformation angle of up to 90° and thus avoid its breakage. The slats 4 of the arm 200

are also made of a material comprising glass fibers in a resin matrix, so as to impart lightness and flexibility to the arm.

[032] According to a possibility not shown in Figures 1 and 2, (but visible in Figure 3) each of the spacers 5 comprises at least one first bearing surface 6 in contact with one of the two slats 4 and a second bearing surface 7 in contact with the other of the two slats 4. At least the first bearing surface 6 is configured (by a slight concave curvature) to generate a slight convex curvature to said slat 4 in contact. Thus, each portion of the slat 4 disposed between two spacers 5 takes a slight concave inflection between the spacers 5. When the second bearing surface 7 also has a slight concave curvature, the curvature is transferred to the two slats 4 of the bearing arm 200.

[033] Figure 3 shows an enlargement of an arm 200 configured according to a second embodiment of the invention. In this alternative, the arm 200 comprises three slats 4 instead of two. In particular, the arm 200 is comprised of a central slat 8 surrounded by a first lateral slat 9 and a second lateral slat 11. These three slats 4 are substantially flat and held opposite each other in pairs. They are attached in pairs of adjacent slats 4, according to the same configuration as that having two slats 4. The three slats 4 extend into three separate planes of extension, parallel to each other. The spacer system comprises spacers 5 spaced along the arm 200. The spacers 5 are furthermore joined in pairs, extending on either side of the central slat 8 and respectively between the first lateral slat 9 and the second lateral slat 11, which makes it possible to impart the desired flexibility to the arm 200.

[034] According to the possibility shown in Figure 3, the spacers 5 have a first bearing surface 6 against the first lateral slat 9 or the second lateral slat 11, configured to generate a slight convex curvature to the bearing slat 9.11. As shown here, the first bearing surface 6 imparts a slight convex curvature thanks to a slightly concave surface.

[035] The second bearing surface 7 of the spacers bears on the central slat 8 intended to remain flat, the second bearing surface 7 is devoid of any means of bending the slat 8.

[036] An alternative embodiment of the spacer system is shown in Figure 4. This spacer system comprises a spacer 5 made of elastomeric material, extending longitudinally between the two adjacent slats 4, over the entire length of the slats 4. According to another possibility not shown, the spacer 5 extends over at least 50% of the length of the slats 4.

[037] According to an arrangement not shown, the arm 200 comprises a plurality of substantially flat slats 4, maintained spaced apart, substantially opposite each other and each extending in a respective plane of extension, the planes being parallel to each other.

[038] Thus, the arm according to the invention comprises light and flexible slats, 5 imparting considerable flexibility to the arm in a plane perpendicular to the planes of extension of the slats, while remaining very rigid in the plane of extension, so as to avoid oscillations during the opening/closing of the arm. This ability to deform elastically in one plane may be reinforced by spacers or other inflection parts complementary to the spacers, configured to introduce concave inflection points on the slats. When subjected to an impact, 10 the resulting arm may be deformed at an angle of 90° and then returned to the initial closed position without damaging the slats.

CLAIMS

- 1) An arm (200) for an automatic barrier (100) for controlling the traffic of vehicles, especially on traffic lanes or sites with controlled access, the arm (200) comprising a plurality of slats (4) substantially flat, maintained spaced apart, substantially opposite each other and each extending in a respective plane of extension, the planes of extension being substantially parallel to each other, the slats (4) being configured so as to permit elastic deformation of the arm (200) in a plane perpendicular to the planes of extension, between a closed position wherein the arm (200) prohibits traffic and a deformed position (D) wherein at least a portion of the arm (200) is oblique with respect to the direction of traffic.
- 2) The arm (200) according to the preceding claim, which comprises a spacer system, configured to attach in pairs all of the adjacent slats (4) of the plurality of slats (4), keeping them spaced apart and substantially facing each other.
- 3) The arm (200) according to claim 2, wherein the spacer system comprises at least one spacer (5) extending longitudinally between two adjacent slats (4).
- 4) The arm (200) according to claim 2 or 3, wherein the spacer system comprises spacers inserted between the adjacent slats (4) and spaced along the arm (200).
- 5) The arm (200) according to any one of claims 3 to 4, wherein the at least one spacer (5) comprises at least one first bearing surface (6) in contact with a slat, and an opposite second bearing surface (7) in contact with an adjacent slat (4), the first bearing surface (6) being configured to generate at least one curvature convex to the slat (4) in contact with the first bearing surface (6).
- 6) The arm (200) according to claim 5, wherein the second bearing surface (7) is configured to generate at least one convex curvature of the adjacent slat (4) bearing on the second bearing surface (6).
- 7) The arm (200) according to any one of claims 2 to 5, wherein the plurality of slats (4) is comprised only of a central slat (8), a first lateral slat (9) and a second lateral slat (11), adjacent to the central slat (8), the arm (200) comprising at least two spacers on either side of the central slat (8).

- 8) The arm (200) according to the preceding claim combined with claim 5, wherein the at least two spacers have the first bearing surface (6) in contact with the first lateral slat (9) and the second lateral slat (11) respectively.
- 9) The arm (200) according to any one of the preceding claims, wherein the plurality of slats (4) comprises a fibrous material.
- 10) Automatic barrier (100) for controlling vehicle traffic, in particular on traffic lanes or sites with controlled access, the automatic barrier (100) comprising:
- a support device (1) configured to attach the automatic barrier (100) to the ground,
 - an arm (200) according to any one of claims 1 to 9, the arm (200) being mounted movable on the support device (1) between a closed position wherein the arm (200) prohibits traffic and an open position wherein the arm (200) permits traffic,
 - an actuation system (2) configured to actuate the movement of arm (200) between its closed position and its open position.