heavy system that has to be taken into account for road holding of the bus.

Documents US 2011/316474 and US 6 157 162 are also known in the state of the art, each of which describes an electric coupling device for charging an electric vehicle.

Embodiments of the invention seek to disclose means of improving the state of the art.

A first aspect of the present invention provides an electric coupling device for an electric vehicle charging station comprising a ram/coupler fitted with an extendable arm suitable for being moved between a retracted position and an extended position in which the arm is adapted to provide an electric link, and support means for supporting the ram/coupler allowing two degrees of rotational freedom of the ram relative to a support base, about two axes transverse to each other and orthogonal to a direction of extension of the arm, the ram/coupler being placed in a protective housing capable of angular displacement about a vertical axis and about a horizontal axis perpendicular to the direction of extension of the arm relative to a support base, the device being characterised in that the extendable arm is mounted on a means connected to a strand of a belt driven by a geared motor, a counterweight being connected to a strand opposite the belt and in that the protective casing is provided with a door free to move in displacement between a closed position in the retracted position of the extendable arm, and an open position in the extended position of the arm.

An expert in the subject will understand that embodiments of the invention thus disclose a ram system associated with the charging

station and that will cooperate with the vehicle that arrives in front of a charging station.

The ram has several degrees of freedom to optimise the connection between the station and the vehicle. The ram also comprises a reliable and safe movement control system to optimise operation and prevent any dysfunction problems.

According to embodiments of the invention:

- the extendable arm is at least partly flexible (or at least includes a flexible part),
- the ram/coupler is placed in a box or casing comprising a door pulled into the closed position when the ram/coupler is in the retracted position, and automatically opens when an arm extension command is given,
- the device comprises a counterweight that is moved automatically in the direction opposite to the direction of extension of the extendable arm, so as to keep the centre of gravity of the assembly approximately at the intersection point of the two pivot axes of the support means,
- the device comprises means forming a stop limiting angular movements around the pivot axes and damping means slowing displacements around the pivot axes.

A second aspect of the present invention relates to an electric vehicle charging station equipped with an electric coupling device as defined in the first aspect.

Other technical characteristics, purposes and advantages of this invention will become clear after reading the detailed description given below, with reference to the appended drawings given as non-limitative examples, and on which:

- figure 1 represents a perspective diagrammatic view of an electric coupling device conforming with the invention when the extendable arm is in the retracted position, upper, lower and lateral elements of the case not being shown so as to illustrate the internal structure of the device,
- figure 2 represents another similar perspective view of the device according to this invention in the retracted position of the arm with an observation orientation different from that in figure 1, with other elements of the case not shown,

CLAIMS

1. Electric coupling device for an electric vehicle charging station comprising a ram/coupler fitted with an extendable arm suitable for being moved between a retracted position and an extended position in which the arm is adapted to provide an electric link, and support means for supporting the ram/coupler allowing two degrees of rotational freedom of the ram/coupler relative to a support base, about two axes transverse to each other and orthogonal to a direction of extension of the arm, the ram/coupler being placed in a protective housing capable of angular displacement about a vertical axis and about a horizontal axis perpendicular to the direction of extension of the arm relative to a support base,

   the device being characterised in that the extendable arm is mounted on a means connected to a strand of a belt driven by a geared motor, a counterweight being connected to a strand opposite the belt and in that the protective casing is provided with a door free to move in displacement between a closed position in the retracted position of the extendable arm, and an open position in the extended position of the arm.

2. Device according to claim 1, characterised by the fact that the arm is at least partly flexible.

3. Device according to one of claims 1 and 2, characterised by the fact that the door is held elastically in the closed position by a pin fitted on the counterweight and loaded elastically in the open position to return to its rest position.

4. Device according to one of claims 1 to 3, characterised by the fact that it comprises a support base adapted to be fixed to a support point and an intermediate element installed free to make angular movements about a vertical axis on the support base, the protection case of the ram/coupler being installed free to move in the axial direction about a second axis on the intermediate element.

5. Device according to one of claims 1 to 4, characterised by the fact that it comprises stops limiting the angular movement of the support means of the ram/coupler.

6. Device according to one of claims 1 to 5, characterised by the fact that it comprises damping means constraining the angular movement of the support means of the ram/coupler.

7. Device according to one of claims 1 to 6, characterised by the fact that the ram/coupler is mounted on a carriage guided in translation on rails.

8. Electric vehicle charging station, characterised by the fact that it is equipped with an electric coupling device according to one of claims 1 to 7.