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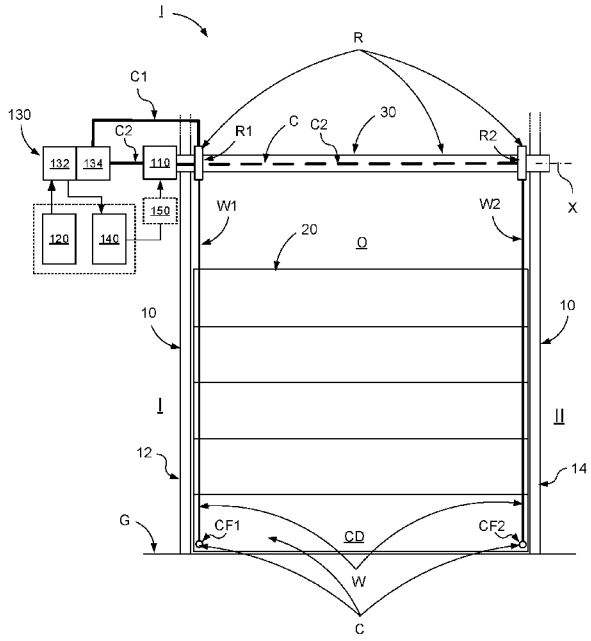


Fig. 1

(57) Abstract: ASSA ABLOY Entrance Systems AB has developed the present invention relates to an overhead door operator system (I; II; III). The system comprises: a door frame (10) comprising a first frame section (12) at a first side (I) of the opening (O) and a second frame section (14) at a second side (II) of the opening (O) opposite the first side (I); a door (20) arranged in connection to the door frame (10) to be moved between an open position and closed position; a wire configuration (W) attached to said door (20), and comprising a first wire member (W1) arranged at said first side (I) and a second wire member (W2) arranged at said second side (II); a door movement arrangement connected to said wire configuration (W) and arranged to move the door (20) from the closed position to the open position by means of said wire configuration (W); a conductor arrangement (C) connected to said wire configuration (W) so as to provide a conductive circuit comprising said wire configuration (W); an electrical signal generator (120) configured to provide an electrical signal to said conductive circuit; and a detection arrangement (140) configured to: determine whether there is an electrical signal in said circuit; and, if it is determined that there is no electrical signal, take action so as to facilitate preventing more extensive damage.

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OVERHEAD DOOR OPERATOR SYSTEM

TECHNICAL FIELD

The present invention relates to an overhead door operator system for opening and closing an opening. The present invention relates to a method for controlling an overhead door operator system for opening and closing an opening.

BACKGROUND

Overhead doors such as overhead sectional doors are normally configured to be lifted by wires. Overhead door operator systems for overhead doors comprises a door frame with left and right frame sections and a door arranged to be moved between an open position and closed. Overhead door operator systems further comprises a roller arrangement arranged above the door comprising a left drum and a right drum, wherein a left wire connected to the door is configured to be rolled up and out by the left drum and a right wire connected to the door is configured to be rolled up and out by the right drum for moving the door between open and closed position. The door may be moved by a door movement arrangement, e.g. a drive unit, connected to said wire configuration via said drums. Brake of a wire will result in the overhead door operator system no longer suitable for operation, and operation may result in more extensive damage and/or safety issues. One way of addressing such a problem may be to use spring-loaded switches, where the weight of the door will tension the springs and hold a switch in a closed state, and when a wire breaks the tension on the spring is lost so that the connector breaks the circuit. With such spring-loaded wire break detectors, vibrations from the moving door can trigger the cable break detector making it difficult to manoeuvre the door.

There is thus a need to provide an overhead door operator system, which facilitates easy and efficient detection of such a wire brake.

OBJECTS OF THE INVENTION

An object of the present invention is to provide an overhead door operator system for opening and closing an opening, which facilitates easy and efficient determination of wire break.

Another object of the present invention is to provide a method for controlling an overhead door operator system for opening and closing an opening, which facilitates easy and efficient determination of wire break.

SUMMARY OF THE INVENTION

These and other objects, apparent from the following description, are achieved by an overhead door operator system and method as set out in the appended independent claims. Preferred embodiments of the overhead door operator system are defined in appended dependent claims.

Specifically an object of the invention is achieved by an overhead door operator system. The overhead door operator system is configured for opening and closing an opening. The system comprises a door frame comprising a first frame section at a first side of the opening and a second frame section at a second side of the opening opposite the first side. The system further comprises a door arranged to be moved between an open position and closed position, the door being movably arranged in connection to the door frame. The system further comprises a wire configuration attached to said door, said wire configuration comprising a first wire member arranged in connection to said first side and a second wire member arranged in connection to said second side. The system further comprises a door movement arrangement,

said door movement arrangement being connected to said wire configuration and being arranged to move the door from the closed position to the open position by means of said wire configuration. The system further comprises a conductor arrangement connected to said wire configuration so as to provide a conductive circuit comprising said wire configuration. The system further comprises an electrical signal generator configured to provide an electrical signal to said conductive circuit; and a detection arrangement arranged to detect whether there is an electrical signal in said circuit. The detection arrangement is configured to: determine whether or not there is an electrical signal in said circuit; and, if it is determined that there is no electrical signal, take action so as to facilitate preventing more extensive damage. Hereby extensive damage associated with a wire break may be easily and efficiently avoided. Hereby a wire break may be easily and efficiently determined. Provision of such a conductor arrangement with an electrical circuit where electrical signal in said circuit facilitates easy updating of an overhead door operator system for easy and efficient determination of a wire break. With such a solution there is no risk of detection being triggered by vibrations from the moving door, which may be the case for spring-loaded wire break detectors, since the wires are attached to the door. Further, by thus utilizing said wire configuration in said conductor arrangement, no additional electric cable needs to be connected to the door.

According to an embodiment of the overhead door operator system, the detection arrangement, when taking action, is configured to provide information so that a brake function for preventing uncontrolled movement of the door is activated. Hereby extensive damage associated with a wire break may be easily and efficiently avoided.

According to an embodiment of the overhead door operator system, the detection arrangement, when taking action, is configured to provide information so that operation of the door operator system associated with

opening and closing the opening is prevented. Hereby extensive damage associated with a wire break may be easily and efficiently avoided.

According to an embodiment of the overhead door operator system, the detection arrangement, when taking action, is configured to provide information so that a visual and/or audial and/or tactile warning signal is activated so as to facilitate alerting door operators of door malfunction. Hereby operators may be efficiently alerted of malfunction of said overhead door operator system.

According to an embodiment the overhead door operator system further comprises a roller arrangement arranged above the door and rotatable about an axis, said roller arrangement comprising a first roller, wherein said first wire member is connected to said first roller arranged at said first side, and a second roller, and wherein said second wire member is connected to said second roller arranged at said second side, wherein said door movement arrangement is operably connected to said roller arrangement so as to rotate said rollers for rolling up said first wire member and second wire member so as to move said door to said open position. Hereby efficient operation of said overhead door operator system is facilitated.

According to an embodiment of the overhead door operator system, said conductor arrangement comprises a first conductor wire configured to be connected to said first wire member in connection to said first roller and a second conductor wire configured to be connected to said second wire member in connection to said second roller, said conductor wires being configured to facilitate said conductive circuit. Hereby said conductor arrangement may be efficiently provided.

According to an embodiment of the overhead door operator system, said roller arrangement comprises a hollow shaft arranged to run between said first side and second side II, wherein said first roller is arranged around said shaft at said first side, and said second roller is arranged about said shaft at said

second side, wherein said door movement arrangement is operably connected to said shaft so as to rotate said rollers, wherein said second conductor wire is arranged to run through said hollow shaft so as to facilitate said conductive circuit. Hereby said conductor arrangement may be efficiently provided so that provision of said conductive circuit is facilitated.

According to an embodiment of the overhead door operator system, said overhead door operator system further comprising an electrical connection device arranged in connection to said roller arrangement and configured to transfer said electrical signal from the electrical signal generator being fixed so as to facilitate electrical connection with conductor wires rotating with said roller arrangement so as to facilitate said conductive circuit. By thus providing such an electrical connection device, connection associated with rotation of said roller arrangement with the wire members and none rotating parts may be efficiently obtained so that said conductive circuit is facilitated.

According to an embodiment of the overhead door operator system, said electrical connection device comprises a fixed member configured to be connected to and receive said electrical signal from the electrical signal generator, and a rotatable member configured to rotate with said roller arrangement and be electrically connected and rotatably arranged relative to said fixed member, said conductor wires being connected to said rotatable member. By thus providing such an electrical connection device, transfer of electrical signal to and from rotating parts of said conductor arrangement associated with rotation of said roller arrangement and none rotating parts may be efficiently obtained so that said conductive circuit is efficiently facilitated.

According to an embodiment of the overhead door operator system, said electrical connection device comprises a first electrical connection unit arranged in connection to said first roller of said roller arrangement arranged at the first side, wherein said first conductor wire connected to said first wire member is connected to a rotatable member of said first connection unit, and a second electrical connection unit arranged in connection to said second roller

of said roller arrangement arranged at the second side, wherein said second conductor wire connected to said second wire member is connected to a rotatable member of said second connection unit, wherein said conductor arrangement comprises a third conductor wire configured to be connected between a fixed member of said first connection unit and a fixed member of said second connection unit so as to facilitate said conductive circuit. Hereby a conductive wire between said first side and said second side of said overhead door operator system which is fixed, and thus does not have to rotate with the roller arrangement, may be provided.

According to an embodiment of the overhead door operator system, said conductor arrangement comprises a first conductive fastener for attaching the first wire member to the door at the first side, a second conductive fastener for attaching the second wire member to the door at the second side, and a conductive door portion to which said fasteners are connected so that conductive connection between said wire members are provided through said door for providing said conductive circuit. Hereby said conductive circuit may be easily and efficiently provided. With such a solution there is no risk of detection being triggered by vibrations from the moving door since the wires are attached to the door. Further, no additional electric cable needs to be connected to the door. Such attachment to the door by means of said wire members facilitates providing a connection at the door with no moving parts and essentially no protrusion from the door.

According to an embodiment of the overhead door operator system, said wire configuration comprises a third wire member arranged between said first wire member and second wire member such that said wire configuration forms a single wire, wherein said first wire member is attached to the door at the first side by means of first fastener and said second wire member is attached to the door at the second side II by means of second fastener, with said third wire member running there between for providing said conductive circuit. Hereby said conductive circuit may be easily and efficiently provided. Hereby a wire

configuration only requiring one wire is facilitated. Herby no conductive door portion is required. Hereby no conductive fasteners are required. With such a solution there is no risk of detection being triggered by vibrations from the moving door since the wires are attached to the door. Further, no additional electric cable needs to be connected to the door. Such attachment to the door by means of said wire members facilitates providing a connection at the door with no moving parts and essentially no protrusion from the door.

According to an embodiment of the overhead door operator system, said door movement arrangement comprises a drive unit for moving said door by means of said wire configuration.

According to an embodiment of the overhead door operator system, said door movement arrangement comprises mechanical device for manually moving said door by means of said wire configuration.

Specifically an object of the invention is achieved by a method for controlling an overhead door operator system. The overhead door operator system is configured for opening and closing an opening. The system comprises a door frame comprising a first frame section at a first side of the opening and a second frame section at a second side of the opening opposite the first side. The system further comprises a door arranged to be moved between an open position and closed position, the door being movably arranged in connection to the door frame. The system further comprises a wire configuration attached to said door, said wire configuration comprising a first wire member arranged in connection to said first side and a second wire member arranged in connection to said second side. The system further comprises a door movement arrangement, said door movement arrangement being connected to said wire configuration and being arranged to move the door from the closed position to the open position by means of said wire configuration. The system further comprises a conductor arrangement connected to said wire configuration so as to provide a conductive circuit comprising said wire configuration. The system further comprises an electrical signal generator

configured to provide an electrical signal to said conductive circuit; and a detection arrangement arranged to detect whether there is an electrical signal in said circuit. The method comprises the steps of: determining whether or not there is an electrical signal in said circuit; and, if it is determined that there is no electrical signal, taking action so as to facilitate preventing more extensive damage.

According to an embodiment, the step of taking action comprises activating a brake function for preventing uncontrolled movement of the door.

According to an embodiment, the step of taking action comprises preventing operation of the door operator system associated with opening and closing the opening.

According to an embodiment, the step of taking action comprises sending a visual and/or audial and/or tactile warning signal so as to facilitate alerting door operators of door malfunction.

The method for controlling an overhead door operator system according to the present disclosure has the advantages according to the corresponding overhead door operator system as set out herein.

BRIEF DESCRIPTION OF THE DRAWINGS

For a better understanding of the present disclosure reference is made to the following detailed description when read in conjunction with the accompanying drawings, wherein like reference characters refer to like parts throughout the several views, and in which:

Fig. 1 schematically illustrates a front view of an overhead door operator system for opening and closing an opening, according to an embodiment of the present disclosure;

Fig. 2 schematically illustrates a front view of an overhead door operator system for opening and closing an opening, according to an embodiment of the present disclosure;

Fig. 3 schematically illustrates a front view of an overhead door operator system for opening and closing an opening, according to an embodiment of the present disclosure; and,

Fig. 4 schematically illustrates a flow chart of a method for controlling an overhead door operator system for opening and closing an opening, according to an embodiment of the present disclosure.

DETAILED DESCRIPTION

Embodiments of the invention will now be described with reference to the accompanying drawings. The invention may, however, be embodied in many different forms and should not be construed as limited to the embodiments and aspects set forth herein; rather, these embodiments and aspects are provided so that this disclosure will be thorough and complete, and will fully convey the scope of the invention to those skilled in the art. The terminology used in the detailed description of the particular embodiments/aspects illustrated in the accompanying drawings is not intended to be limiting of the invention. In the drawings, like numbers refer to like elements.

The overhead door operator system according to the present disclosure may be an overhead door operator system having a sectional door comprising a plurality of horizontal and interconnected sections arranged to be connected to the door frame of the overhead door operator system. The overhead door operator system according to the present disclosure may be a door operator system where the door, in the closed position is arranged substantially vertical, and in the open position is arranged in an inclined position relative to said vertical position, e.g. a horizontal position or a position with an angle between

said vertical position and said horizontal position. The overhead door operator system according to the present disclosure may be a door operator system where the door, in both the closed position and open position is arranged substantially vertical, which solution e.g. may be applied where the sealing is a relatively high level relative to the ground

The door according to the present disclosure may be any suitable door such as a garage door or an industrial door.

Fig. 1 schematically illustrates a front view of an overhead door operator system I for opening and closing an opening O, according to an aspect of the present disclosure.

The overhead door operator system I is arranged to be installed in said opening O, which, according to an aspect of the present disclosure may be defined by a wall and a ground/floor.

The overhead door operator system I comprises a door frame 10. Said door frame 10 comprises a first frame section 12 at a first side I of the opening O and a second frame section 14 at a second side II of the opening O opposite the first side I.

The overhead door operator system I further comprises a door 20 arranged to be moved between an open position and closed position. The door 20 is configured to be movably arranged in connection to the door frame 10. According to an aspect of the present disclosure, said door 20 is an overhead sectional door.

The overhead door operator system I further comprises a wire configuration W attached to said door 20. Said wire configuration W comprises a first wire member W1 arranged in connection to said first side I and a second wire member W2 arranged in connection to said second side II.

The overhead door operator system I further comprises a door movement arrangement. Said door movement arrangement is connected to said wire

configuration W and is arranged to move the door 20 from the closed position to the open position by means of said wire configuration W.

According to the exemplary embodiment of the overhead door operator system I illustrated in fig. 1, said door movement arrangement comprises a drive unit 110 for moving said door by means of said wire configuration W. According to an aspect of the present disclosure, said drive unit 110 comprises an electric motor.

According to an alternative embodiment of the overhead door operator system, not shown, said door movement arrangement comprises a mechanical device for manually moving said door by means of said wire configuration.

According to an aspect of the present disclosure, said overhead door operator system I comprises a roller arrangement R. Said roller arrangement R is configured to be arranged above the door 20, at least when the door 20 is in the closed portion. Said roller arrangement is configured to be rotatable about an axis X.

Said roller arrangement comprises a first roller R1 rotatable about said axis X. Said first roller R1 is configured to be arranged at said first side I. Said first roller R1 is configured to be arranged in connection to said first frame section 12. Said first wire member W1 is connected to said first roller R1. According to an aspect of the present disclosure, said first roller R1 is provided by a drum member. Said first roller R1 is arranged, when rotating, is to roll up or roll out said first wire member W1. Said first wire member W1 is configured to be rolled up around said first roller R1 for moving said door 20 to said open position. Said first roller R1 is according to an aspect of the present disclosure of an electrically isolating material, e.g. a plastic material or the like.

Said roller arrangement comprises a second roller R2 rotatable about said axis X. Said second roller R2 is configured to be arranged at said second side II. Said second roller R2 is configured to be arranged in connection to said second frame section 14. Said second wire member W2 is connected to said

second roller R2. According to an aspect of the present disclosure, said second roller R2 is provided by a drum member. Said second roller R2 is arranged, when rotating, is to roll up or roll out said second wire member W2. Said second wire member W2 is configured to be rolled up around said second roller R2 for moving said door 20 to said open position. Said second roller R2 is according to an aspect of the present disclosure of an electrically isolating material, e.g. a plastic material or the like.

Said door movement arrangement is operably connected to said roller arrangement R so as to rotate said rollers R1, R2 for rolling up said first wire member W1 and second wire member W2 so as to move said door 20 from said closed position to said open position. According to the embodiment illustrated in fig. 1, said drive unit 110 is operably connected to said roller arrangement R so as to rotate said rollers R1, R2 for rolling up said first wire member W1 and second wire member W2 so as to move said door 20 from said closed position to said open position.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said roller arrangement R comprises a hollow shaft 30 arranged to run between said first side I and second side II.

Said first roller R1 is arranged around said shaft 30 at said first side I. Said first roller R1 is arranged around said shaft 30 at said first frame section 12. Said second roller R2 is arranged about said shaft 30 at said second side II. Said second roller R2 is arranged about said shaft 30 at said second frame section 14.

Said door movement arrangement is operably connected to said shaft 30 so as to rotate said rollers R1, R2. According to the embodiment illustrated in fig. 1, said drive unit 110 is operably connected to said shaft 30 so as to rotate said rollers R1, R2. According to an aspect of the present disclosure, said drive unit 110 is arranged to rotate said shaft so as to rotate said rollers R1, R2.

Said overhead door operator system I further comprises a conductor arrangement C configured to be connected to said wire configuration W so as to provide a conductive circuit comprising said wire configuration W.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said conductor arrangement C comprises a first conductor wire C1 configured to be connected to said first wire member W1 in connection to said first roller R1. Said conductor wire has, according to an aspect of the present disclosure, an isolation. Said first conductor wire C1 may also be denoted cable, or electric cable.

According to an aspect of the present disclosure, not shown or further described, but which may be valid as alternative for all overhead door operator systems I; II; III, said first conductor wire C1 may constitute a portion of the first wire member W1, constituting an extension from the first roller R1 for said conductor arrangement C and hence said conductive circuit. For such a solution, care should be taken for proper isolation relative to other conductive parts.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said conductor arrangement C comprises a second conductor wire C2 configured to be connected to said second wire member W2 in connection to said second roller R2. Said conductor wire has, according to an aspect of the present disclosure, an isolation. Said second conductor wire C2 may also be denoted cable, or electric cable.

According to an aspect of the present disclosure, not shown or further described, but which may be valid as alternative for all overhead door operator systems I; II; III, said second conductor wire C2 may constitute a portion of the second wire member W2, constituting an extension from the first roller R2 for said conductor arrangement C and hence said conductive circuit. For such a solution, care should be taken for proper isolation relative to other conductive parts.

Said conductor wires C1, C2 are configured to facilitate said conductive circuit. Said second conductor wire C2 is arranged to run through said hollow shaft 30 so as to facilitate said conductive circuit. According to an aspect of the present disclosure said second conductor wire C2 is arranged to rotate with said hollow shaft 30.

Said first conductor wire C1, connected to said first wire member W1, is configured to rotate with said first roller R1.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said conductor wires C1, C2 are arranged to rotate with said roller arrangement R.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said conductor arrangement C comprises a first conductive fastener CF1 for attaching the first wire member W1 to the door 20 at the first side I.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said conductor arrangement C comprises a second conductive fastener CF2 for attaching the second wire member W2 to the door 20 at the second side II.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said conductor arrangement C comprises a conductive door portion CD to which said fasteners CF1, CF2 are connected so that conductive connection between said wire members W1, W2 are provided through said door 20 for providing said conductive circuit. Thus, said door 20 comprises a conductive door portion CD. Thus, at least a portion of said door 20 comprises a conductive material. Said fasteners CF1, CF2 are connected so that said wire members W1, W2 are fixedly attached to said door 20.

Said overhead door operator system I further comprises an electrical signal generator 120 configured to provide an electrical signal to said conductive circuit. Said electrical signal generator may be any suitable electrical signal

generator for providing an electrical signal to a circuit. Said electrical signal generator 120 is configured to be fixedly arranged. Said electrical signal generator 120 may be fixedly arranged at any suitable position for facilitating providing an electrical signal to said conductive circuit. According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said electrical signal generator 120 is configured to be fixedly arranged at the first side I.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said overhead door operator system I further comprises an electrical connection device 130 arranged in connection to said roller arrangement R.

Said electrical connection device 130 is configured is configured to be operably connected to said electrical signal generator 120. Said electrical connection device 130 is configured is configured to receive an electrical signal from said electrical signal generator 120. Said electrical signal generator 120 is configured to provide an electrical signal to said electrical connection device 130.

Said electrical connection device 130 is configured to transfer said electrical signal from the electrical signal generator 120 being fixed so as to facilitate electrical connection with conductor wires C1, C2 rotating with said roller arrangement R so as to facilitate said conductive circuit.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said electrical connection device 130 comprises a fixed member 132. Said fixed member 132 is configured to be fixedly attached relative to said rotating roller arrangement R.

Said fixed member 132 of said electrical connection device 130 is configured to be connected to and receive said electrical signal from the electrical signal generator 120. Said fixedly arranged electrical signal generator 120 is arranged to be connected to said fixed member 132 of said electrical connection device 130. Said electrical signal generator 120 is arranged to send

an electrical signal to said fixed member 132 of said electrical connection device 130.

According to an aspect of the present disclosure, illustrated in the embodiment in fig. 1, said electrical connection device 130 comprises a rotatable member 134. Said rotatable member 134 is configured to rotate with said roller arrangement R. Said rotatable member 134 is configured to be rotatably attached to said roller arrangement R. According to an aspect of the present disclosure, said rotatable member 134 is configured to be rotatably attached to said roller arrangement R via said shaft 30.

Said rotatable member 134 is configured to be electrically connected and rotatably arranged relative to said fixed member 132. Said fixed member 132 is configured to be electrically connected to said rotatable member 134. Said fixed member 132 is configured to is configured to transfer said received electrical signal to said rotatable member 134 so as to facilitate providing said conductive circuit.

Said conductor wires C1, C2 are configured to be electrically connected to said rotatable member 134. Said conductor wires C1, C2 are configured to be connected to said rotatable member 134 so that they are allowed to rotate with said rotatable member 134.

Said first conductive wire C1 is configured to be electrically connected to said rotatable member 134 so that the rotation of said first conductive member C1 with said roller arrangement R is facilitated.

Said second conductive wire C2 is configured to be electrically connected to said rotatable member 134 so that the rotation of said second conductive member C2 with said roller arrangement R is facilitated.

According to an aspect of the present disclosure, said electrical connection device 130 is a so called slip ring connector. According to an aspect of the

present disclosure, said electrical connection device 130 is a so called 2-pole slip ring connector.

Said conductive circuit is thus provided by means of said first conductive wire C1 connected to said rotatable member 134 of said electrical connection device 130, and connected to said first wire member W1, which in turn is connected to said conductive door portion CD via said first conductive fastener CF1, which in turn is connected to said second wire member W2 by having said second wire member W2 connected to said conductive door portion CD via said second conductive fastener CF2, wherein said second wire member W2 is connected to said second conductive wire C2, which in turn is connected to said rotatable member 134 of said electrical connection device 130.

Said overhead door operator system I further comprises a detection arrangement 140 arranged to detect whether there is an electrical signal in said circuit.

According to an aspect of the present disclosure, said detection arrangement 140 is configured to be fixedly arranged in connection to said electrical connection device 130.

According to an aspect of the present disclosure, said detection arrangement 140 is configured to be operably connected to said electrical connection device 130. According to an aspect of the present disclosure, said detection arrangement 140 is configured to be operably connected to said electrical connection device 130 so that it detects an electrical signal as long as there is an electrical signal in said electrical circuit and detects no electrical signal if there is no electrical signal in said circuit. According to an aspect of the present disclosure, said detection arrangement 140 is configured to be operably connected to said electrical connection device 130 via a link so that said connection device will receive and detect an electrical signal as long as there is an electrical signal in said electrical circuit and will detect lack of electrical signal if there is no electrical signal in said electrical circuit.

According to an aspect of the present disclosure, said detection arrangement 140 is fixedly arranged in connection to said electrical signal generator 120. According to an aspect of the present disclosure, said detection arrangement 140 and said electrical signal generator 120 are configured to be fixedly arranged in a common attachment member.

Said detection arrangement 140 is configured to determine whether or not there is an electrical signal in said circuit. If it is determined that there is no electrical signal, said detection arrangement 140 is configured take action so as to facilitate preventing more extensive damage. Taking action may comprise preventing uncontrolled movement of the door. Taking action may comprise preventing uncontrolled movement of the door. Taking action may comprise visually, audibly and or tactilely alerting door operators.

According to an aspect of the present disclosure, said detection arrangement 140, when taking action, is configured to provide information so that a brake function for preventing uncontrolled movement of the door is activated. Providing information may comprise sending a signal.

According to an aspect of the present disclosure, said detection arrangement 140, when providing information so that a brake function for preventing uncontrolled movement of the door is activated, may be arranged to provide information to said drive unit 110, which may be configured to, based on such information, prevent uncontrolled movement of the door, e.g. by stopping operation of the door. According to an aspect of the present disclosure, said detection arrangement 140, when providing information so that a brake function for preventing uncontrolled movement of the door is activated, may be arranged to provide information to a brake arrangement, not shown, which may be configured to, based on such information, stop movement of the door.

According to an aspect of the present disclosure, said detection arrangement 140, when providing information so that a brake function for preventing uncontrolled movement of the door is activated, may be arranged to provide

information to a device 150, which may be a brake arrangement or the like, which according to an aspect is connected to the drive unit 110, and which may be configured to, based on such information, transfer information to said drive unit 110 so that the drive unit will stop movement of the door 20 or take other desired action. Such a device 150 may be applied in any embodiment of the overhead door operator system according to the present disclosure, e.g. said systems II; III in fig. 2 and 3, where it is not shown.

According to an aspect of the present disclosure, said detection arrangement 140, when taking action, is configured to provide information so that operation of the door operator system associated with opening and closing the opening O is prevented.

According to an aspect of the present disclosure, said detection arrangement 140, when taking action, is configured to provide information so that a visual and/or audial and/or tactile warning signal is activated so as to facilitate alerting door operators of door malfunction. Said visual warning may e.g. be activation of a light, e.g. blinking light, for alerting door operators of door malfunction. Said audial warning may e.g. be activation of an audial alarm signal, or a voice informing about said malfunction, for alerting door operators of door malfunction.

Said detection arrangement 140 may be any suitable detection arrangement for detecting whether there is an electrical signal in said electrical circuit.

According to an aspect of the present disclosure, said detection arrangement 140 comprises a relay unit. According to an aspect of the present disclosure, said relay of said detection arrangement 140 is configured to be connected to said electrical circuit so that the electrical signal of said electrical circuit is arranged to run through the coil of said relay, and if there is no electrical signal through said coil, said relay is configured to take action, e.g. activate a brake function for stopping movement of the door 20. According to an aspect of the present disclosure, said relay may be connected to said electrical connection

device 130. According to an aspect of the present disclosure, said relay may be connected to an action taking device of said system I so that more damage is prevented. Said action taking device may be a stop member of the overhead door operator system I.

According to an aspect of the present disclosure, said detection arrangement 140 comprises or is operably connected to a control device, not shown. Such a control device may be configured to receive information if there is an electrical signal, process said information by means of a processor, and, take action so as to facilitate preventing more extensive damage, if it is informed that there is no electrical signal. Said action may be one or more of said actions mentioned above.

Fig. 2 schematically illustrates a front view of an overhead door operator system II for opening and closing an opening O, according to an aspect of the present disclosure.

The overhead door operator system II according to the embodiment schematically illustrated in fig. 2 differs from the overhead door operator system I according to the embodiment schematically illustrated in fig. 1 by the wire configuration W.

For the overhead door operator system II according to the embodiment schematically illustrated in fig. 2, said wire configuration W comprises a third wire member W3 arranged between said first wire member W1 and second wire member W2 such that said wire configuration W forms a single wire.

Said first wire member W1 is attached to the door 20 at the first side I by means of first fastener F1. Said second wire member W2 is attached to the door 20 at the second side II by means of second fastener F2.

Said third wire member W3 is configured to run between said first fastener F1 and second fastener F2 for providing said conductive circuit C.

Fig. 3 schematically illustrates a front view of an overhead door operator system III for opening and closing an opening O, according to an aspect of the present disclosure.

The overhead door operator system III according to the embodiment schematically illustrated in fig. 3 differs from the overhead door operator systems I and II according to the embodiments schematically illustrated in fig. 1 and 2 by the roller arrangement R and configuration of the electrical connection device R.

The roller arrangement R of the overhead door operator system III according to the embodiment schematically illustrated in fig. 3 does not have a hollow shaft in accordance with the embodiments in fig. 1 and 2.

In the overhead door operator system III according to the embodiment schematically illustrated in fig. 3, said electrical connection device 130 comprises a first electrical connection unit 130A arranged in connection to said first roller R1 of said roller arrangement R arranged at the first side I and a second electrical connection unit 130B arranged in connection to said second roller R2 of said roller arrangement R arranged at the second side II. Said first and second electrical connection units 130A, 130B may have essentially the same configuration and essentially the same function as the electrical connection device 130 described above with reference to the overhead door operator system I according to the embodiment schematically illustrated in fig. 1.

Said first conductive wire C1 is configured to be electrically connected to said rotatable member 134A so that the rotation of said first conductive member C1 with said first roller R1 is facilitated.

According to an aspect of the present disclosure, said second electrical connection unit 130B comprises a fixed member 132B. Said fixed member 132B is configured to be fixedly attached relative to said second roller R2 of said arrangement R.

According to an aspect of the present disclosure, said second electrical connection unit 130B comprises a rotatable member 134B. Said rotatable member 134B is configured to rotate with said second roller R2 of said arrangement R.

Said second conductive wire C2 is configured to be electrically connected to said rotatable member 134B so that the rotation of said second conductive member C2 with said second roller R2 is facilitated.

In the overhead door operator system III according to the embodiment schematically illustrated in fig. 3, said conductor arrangement C comprises a third conductor wire C3 configured to be connected between said fixed member 132A of said first connection unit 130A and said fixed member 132B of said second connection unit 130B so as to facilitate said conductive circuit.

Hereby a conductive wire C3 between said first side I and said second side II of said overhead door operator system III which is fixed, and thus does not have to rotate with the roller arrangement R, is provided.

According to an aspect of the present disclosure, not shown, the overhead door operator system may be provided with first and second electrical connection units arranged at the respective side I, II in accordance with the embodiment in fig. 3, but with a shaft connected between said first roller R1 and second roller R2, wherein both rollers R1, R2 may be operated by one drive unit so that only one drive unit is required and still facilitating having said fixed third conductor wire C3 between said first and second sides.

Above, the overhead door operator system I; II; III described with reference to fig. 1, 2 and 3, has been provided with a connection device 130 having a fixed member 132 and a rotating member 134 configured to rotate with said roller arrangement R and be electrically connected and rotatably arranged relative to said fixed member 132, with said conductive wire C1, C2 being connected to said rotatable member 134. Said electrical connection device 130 is a so called slip ring connector.

According to an alternative embodiment, the overhead door operator system according to the present disclosure may comprise an arrangement configured to allow said first conductive wire C1 and/or said second conductive wire C2 to be rolled up in connection to said roller arrangement R in connection to movement of the door 20 to the open position and rolled out in connection to movement of the door 20 to the closed position. Thus, according to an aspect of the present disclosure, the overhead door operator system comprises an arrangement configured to allow said first conductive wire C1 and/or said second conductive wire C2 to be rolled up in connection to said roller arrangement R in connection to movement of the door 20 to the open position and rolled out in connection to movement of the door 20 to the closed position.

Such an arrangement configured to allow said first conductive wire C1 and/or said second conductive wire C2 to be rolled up and out may be any suitable arrangement and may be arranged in connection to said first roller R1 and/or said second roller R2.

Hereby a solution for handling rotation of said conductive wires C1, C2 may be provided without requiring a connection device 130 as described above with reference to the embodiments in fig. 1, 2 and 3.

Fig. 4 schematically illustrates a flow chart of a method M1 for controlling an overhead door operator system for opening and closing an opening, according to an embodiment of the present disclosure.

The overhead door operator system is configured for opening and closing an opening. The system comprises a door frame comprising a first frame section at a first side of the opening and a second frame section at a second side of the opening opposite the first side. The system further comprises a door arranged to be moved between an open position and closed position, the door being movably arranged in connection to the door frame. The system further comprises a wire configuration attached to said door, said wire configuration comprising a first wire member arranged in connection to said first side and a

second wire member arranged in connection to said second side. The system further comprises a door movement arrangement, said door movement arrangement being connected to said wire configuration and being arranged to move the door from the closed position to the open position by means of said wire configuration. The system further comprises a conductor arrangement connected to said wire configuration so as to provide a conductive circuit comprising said wire configuration. The system further comprises an electrical signal generator configured to provide an electrical signal to said conductive circuit; and a detection arrangement arranged to detect whether there is an electrical signal in said circuit.

According to the embodiment the method M1 comprises a step S1. In this step it is determined whether or not there is an electrical signal in said circuit.

According to the embodiment the method M1 comprises a step S2. In this step action is taken so as to facilitate preventing more extensive damage, if it is determined that there is no electrical signal.

According to an aspect of the present disclosure, the step of taking action comprises activating a brake function for preventing uncontrolled movement of the door.

According to an aspect of the present disclosure, the step of taking action comprises preventing operation of the door operator system associated with opening and closing the opening.

According to an aspect of the present disclosure, the step of taking action comprises sending a visual and/or audial and/or tactile warning signal so as to facilitate alerting door operators of door malfunction.

The method M1 for controlling an overhead door operator system for opening and closing an opening is according to an embodiment adapted to be performed by any of the overhead door operator systems I; II; III described above with reference to fig. 1, 2 and 3.

The description of the aspects of the disclosure provided herein has been presented for purposes of illustration. The description is not intended to be exhaustive or to limit aspects of the disclosure to the precise form disclosed, and modifications and variations are possible in light of the above teachings or may be acquired from practice of various alternatives to the provided aspects of the disclosure. The examples discussed herein were chosen and described in order to explain the principles and the nature of various aspects of the disclosure and its practical application to enable one skilled in the art to utilize the aspects of the disclosure in various manners and with various modifications as are suited to the particular use contemplated. The features of the aspects of the disclosure described herein may be combined in all possible combinations of methods, apparatus, modules, systems, and computer program products. It should be appreciated that the aspects of the disclosure presented herein may be practiced in any combination with each other.

It should be noted that the word “comprising” does not necessarily exclude the presence of other elements or steps than those listed. It should further be noted that any reference signs do not limit the scope of the claims.

CLAIMS

1. An overhead door operator system (I; II; III), the overhead door operator system (S) being configured for opening and closing an opening (O), the overhead door operator system comprising: a door frame (10) comprising a first frame section (12) at a first side (I) of the opening (O) and a second frame section (14) at a second side (II) of the opening (O) opposite the first side (I); a door (20) arranged to be moved between an open position and closed position, the door (20) being movably arranged in connection to the door frame (10); a wire configuration (W) attached to said door (20), said wire configuration comprising a first wire member (W1) arranged in connection to said first side (I) and a second wire member (W2) arranged in connection to said second side (II); a door movement arrangement, said door movement arrangement being connected to said wire configuration (W) and being arranged to move the door (20) from the closed position to the open position by means of said wire configuration (W); a conductor arrangement (C) connected to said wire configuration (W) so as to provide a conductive circuit comprising said wire configuration (W); an electrical signal generator (120) configured to provide an electrical signal to said conductive circuit; and a detection arrangement (140) arranged to detect whether there is an electrical signal in said circuit, the detection arrangement (140) being configured to:

- determine whether or not there is an electrical signal in said circuit; and,
- if it is determined that there is no electrical signal, take action so as to facilitate preventing more extensive damage.

2. The overhead door operator system according to claim 1, wherein the detection arrangement (140), when taking action, is configured to provide information so that a brake function for preventing uncontrolled movement of the door is activated.

3. The overhead door operator system according to claim 1 or 2, wherein the detection arrangement (140), when taking action, is configured to provide

information so that operation of the door operator system (I; II; III) associated with opening and closing the opening (O) is prevented.

4. The overhead door operator system according to any of claims 1-3, wherein the detection arrangement (140), when taking action, is configured to provide information so that a visual and/or audial and/or tactile warning signal is activated so as to facilitate alerting door operators of door malfunction.

5. The overhead door operator system according to any of claims 1-4, further comprising a roller arrangement (R) arranged above the door (20) and rotatable about an axis (X), said roller arrangement comprising a first roller (R1), wherein said first wire member (W1) is connected to said first roller (R1) arranged at said first side (I), and a second roller (R2), and wherein said second wire member (W2) is connected to said second roller (R2) arranged at said second side (II), wherein said door movement arrangement is operably connected to said roller arrangement (R) so as to rotate said rollers (R1, R2) for rolling up said first wire member (W1) and second wire member (W2) so as to move said door to said open position.

6. The overhead door operator system according to claim 5, wherein said conductor arrangement (C) comprises a first conductor wire (C1) configured to be connected to said first wire member (W1) in connection to said first roller (R1) and a second conductor wire (C2) configured to be connected to said second wire member (W2) in connection to said second roller (R2), said conductor wires (C1, C2) being configured to facilitate said conductive circuit.

7. The overhead door operator system according to claim 6, wherein said roller arrangement (R) comprises a hollow shaft (30) arranged to run between said first side (I) and second side (II), wherein said first roller (R1) is arranged around said shaft (30) at said first side (I), and said second roller (R2) is arranged about said shaft (30) at said second side (II), wherein said door movement arrangement is operably connected to said shaft (30) so as to rotate

said rollers (R1, R2), wherein said second conductor wire (C2) is arranged to run through said hollow shaft (30) so as to facilitate said conductive circuit.

8. The overhead door operator system according to any of claims 5-7, said overhead door operator system further comprising an electrical connection device (130) arranged in connection to said roller arrangement (R) and configured to transfer said electrical signal from the electrical signal generator (120) being fixed so as to facilitate electrical connection with conductor wires (C1, C2) rotating with said roller arrangement (R) so as to facilitate said conductive circuit.

9. The overhead door operator system according to claim 8, wherein said electrical connection device (130) comprises a fixed member (132) configured to be connected to and receive said electrical signal from the electrical signal generator (120), and a rotatable member (134) configured to rotate with said roller arrangement (R) and be electrically connected and rotatably arranged relative to said fixed member (132), said conductor wires (C1, C2) being connected to said rotatable member (134).

10. The overhead door operator system according to claim 8 or 9, wherein said electrical connection device (130) comprises a first electrical connection unit (130A) arranged in connection to said first roller (R1) of said roller arrangement (R) arranged at the first side (I), wherein said first conductor wire (C1) connected to said first wire member (W1) is connected to a rotatable member (134A) of said first connection unit (130A), and a second electrical connection unit (130B) arranged in connection to said second roller (R2) of said roller arrangement (R) arranged at the second side (II), wherein said second conductor wire (C2) connected to said second wire member (W2) is connected to a rotatable member (134B) of said second connection unit (130B), wherein said conductor arrangement (C) comprises a third conductor wire (C3) configured to be connected between a fixed member (132A) of said first connection unit (130A) and a fixed member (132B) of said second connection unit (130B) so as to facilitate said conductive circuit.

11. The overhead door operator system according to any of claims 1-10, wherein said conductor arrangement (C) comprises a first conductive fastener (CF1) for attaching the first wire member (W1) to the door (20) at the first side (I), a second conductive fastener (CF2) for attaching the second wire member (W2) to the door (20) at the second side (II), and a conductive door portion (CD) to which said fasteners (CF1, CF2) are connected so that conductive connection between said wire members (W1, W2) are provided through said door (20) for providing said conductive circuit (C).

12. The overhead door operator system according to any of claims 1-10, wherein said wire configuration (W) comprises a third wire member (W3) arranged between said first wire member (W1) and second wire member (W2) such that said wire configuration (W) forms a single wire, wherein said first wire member (W1) is attached to the door (20) at the first side (I) by means of first fastener (F1) and said second wire member (W2) is attached to the door (20) at the second side (II) by means of second fastener (F2), with said third wire member (W3) running there between for providing said conductive circuit (C).

13. The overhead door operator system according to any preceding claims, wherein said door movement arrangement comprises a drive unit (110) for moving said door by means of said wire configuration.

14. The overhead door operator system according to any preceding claims, wherein said door movement arrangement comprises mechanical device for manually moving said door by means of said wire configuration.

15. A method for controlling an overhead door operator system (S), the overhead door operator system (S) being configured for opening and closing an opening (O), the overhead door operator system comprising: a door frame (10) comprising a first frame section (12) at a first side (I) of the opening (O) and a second frame section (14) at a second side (II) of the opening (O) opposite the first side (I); a door (20) arranged to be moved between an open position and closed position, the door (20) being movably arranged in

connection to the door frame (10); a wire configuration (W) attached to said door (20), said wire configuration comprising a first wire member (W1) arranged in connection to said first side (I) and a second wire member (W2) arranged in connection to said second side (II); a door movement arrangement, said door movement arrangement being connected to said wire configuration (W) and being arranged to move the door (20) from the closed position to the open position by means of said wire configuration (W); a conductor arrangement (C) connected to said wire configuration (W) so as to provide a conductive circuit comprising said wire configuration (W); an electrical signal generator (120) configured to provide an electrical signal to said provided conductive circuit; and a detection arrangement (140) for detecting whether there is an electrical signal in said circuit, the method comprising the steps of:

- determining (S1) whether or not there is an electrical signal in said circuit; and,
- if it is determined that there is no electrical signal, taking action (S2) so as to facilitate preventing more extensive damage.

16. The method according to claim 15, wherein the step of taking action comprises activating a brake function for preventing uncontrolled movement of the door.

17. The method according to claim 15 or 16, wherein the step of taking action comprises preventing operation of the door operator system (I; II; III) associated with opening and closing the opening (O).

18. The method according to any of claims 15-17, wherein the step of taking action comprises sending a visual and/or audial and/or tactile warning signal so as to facilitate alerting door operators of door malfunction.

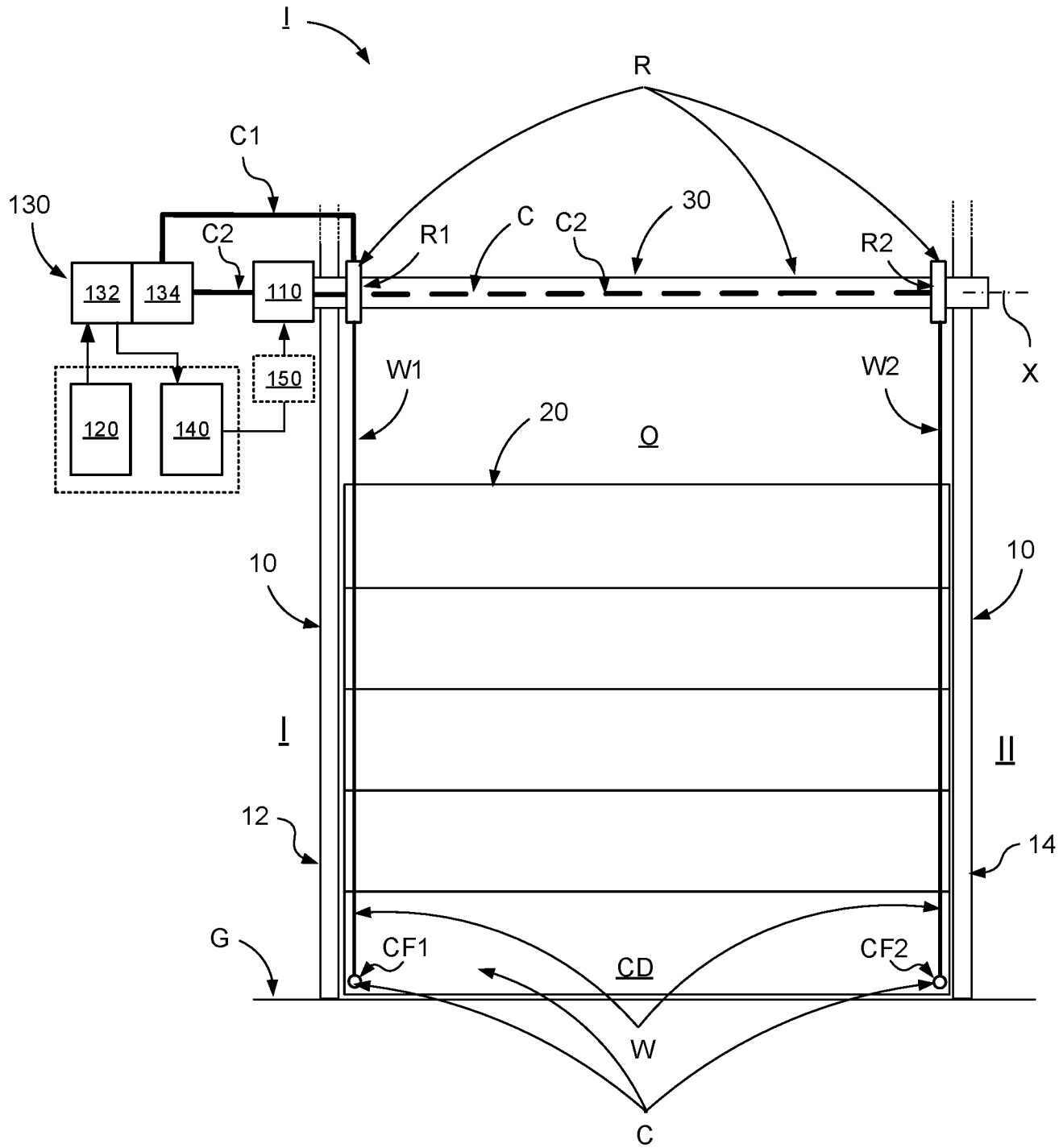

I
R
C1
130
C2
R1
C
C2
30
R2
132
134
110
X
W1
W2
150
120
140
20
O
10
10
I
II
12
14
G
CF1
CD
CF2
W
C

Fig. 1

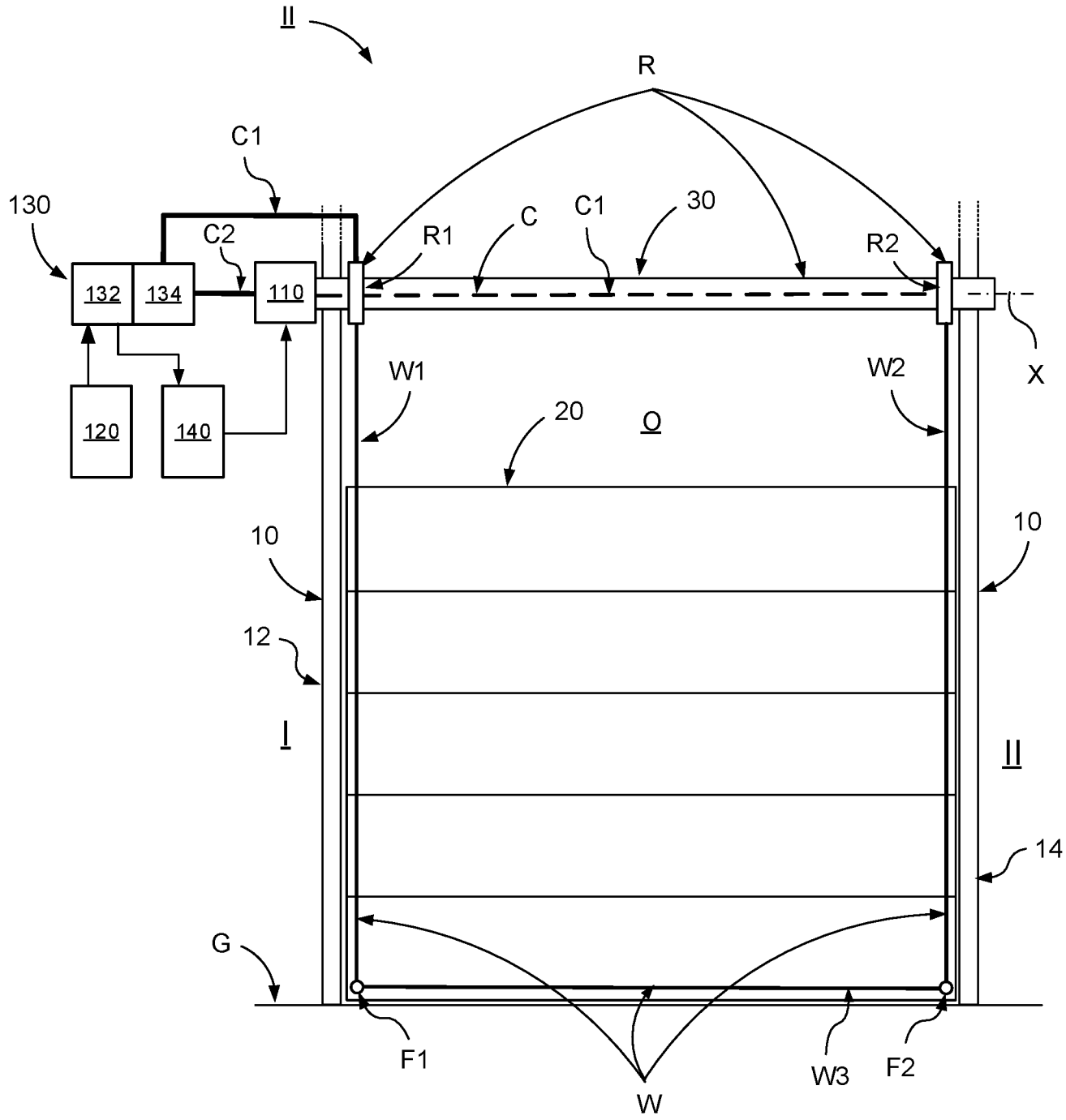

II
R
C1
130
C2
C
C1
30
R1
R2
132
134
110
X
W1
W2
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10
12
I
II
14
G
F1
W
W3
F2

Fig. 2

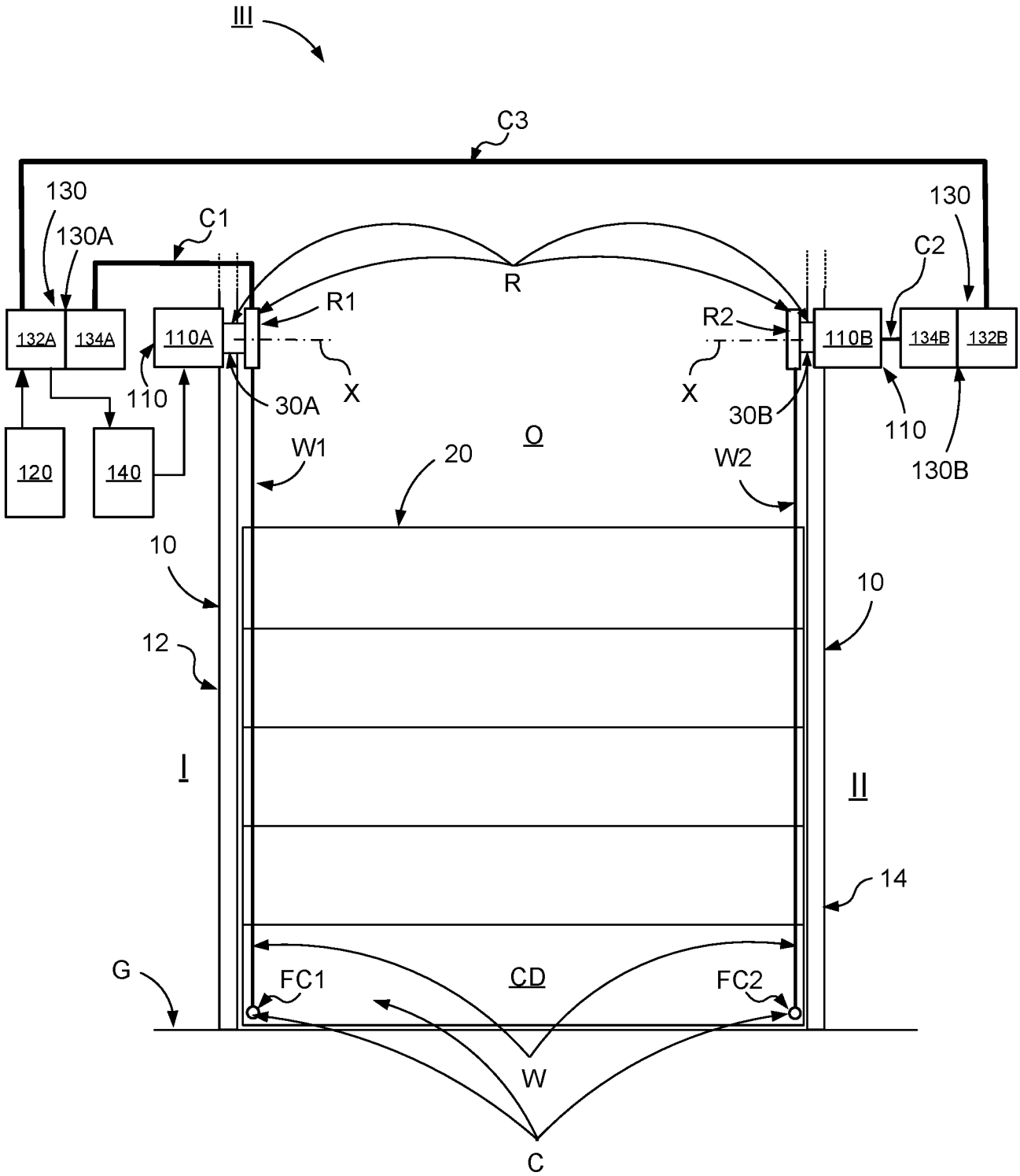

III
C3
130
130A
C1
R
130
C2
R1
R2
132A
134A
110A
110B
134B
132B
110
X
X
30A
30B
110
130B
120
140
W1
O
W2
20
10
10
12
I
II
14
G
FC1
CD
FC2
W
C

Fig. 3

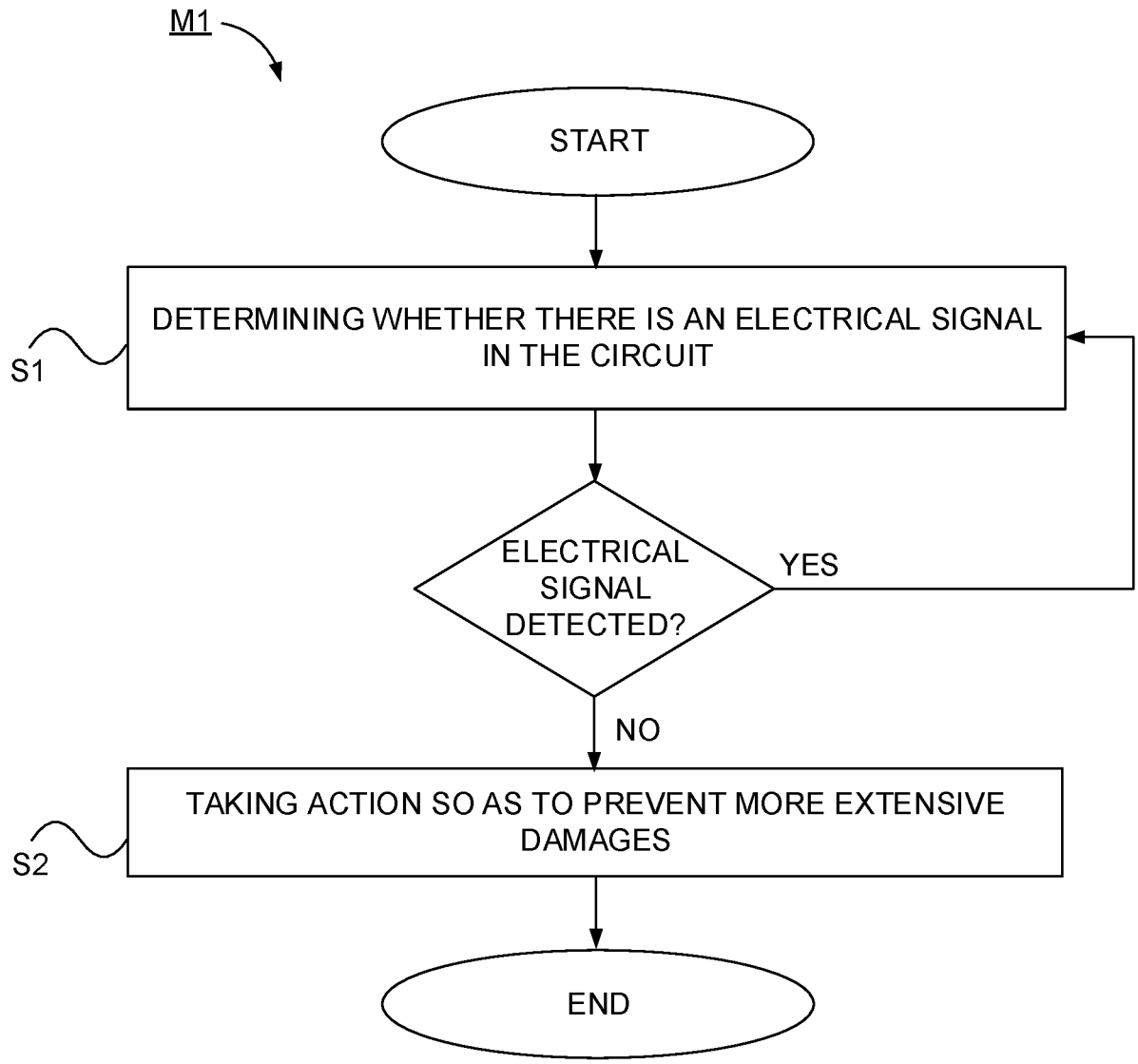

M1
START
DETERMINING WHETHER THERE IS AN ELECTRICAL SIGNAL IN THE CIRCUIT
S1
ELECTRICAL SIGNAL DETECTED?
YES
NO
TAKING ACTION SO AS TO PREVENT MORE EXTENSIVE DAMAGES
S2
END

Fig. 4

INTERNATIONAL SEARCH REPORT

International application No
PCT/EP2022/060979

A. CLASSIFICATION OF SUBJECT MATTER
INV. E05D13/00 E05F15/686
ADD.

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
E05D E05F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practicable, search terms used)
EPO-Internal

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category*	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	DE 10 2005 052518 A1 (HOERMANN KG ANTRIEBSTECHNIK [DE]) 18 January 2007 (2007-01-18) paragraph [0024]; claim 1; figure 1 paragraph [0031] - paragraph [0033] paragraph [0044] paragraph [0064] -----	1-18
A	EP 3 647 523 A1 (CONDOOR GROUP B V [NL]) 6 May 2020 (2020-05-06) abstract -----	1-18

☐ Further documents are listed in the continuation of Box C.

☒ See patent family annex.

* Special categories of cited documents :

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier application or patent but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

"X" document of particular relevance;; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone

"Y" document of particular relevance;; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art

"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 August 2022	26/08/2022

Name and mailing address of the ISA/	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Fax: (+31-70) 340-3016	Berote, Marc

1

INTERNATIONAL SEARCH REPORT

Information on patent family members

International application No
PCT/EP2022/060979

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
DE 102005052518 A1	18-01-2007	DE 102005052518 A1	18-01-2007
		DE 202006020317 U1	03-07-2008
		WO 2007009412 A1	25-01-2007
EP 3647523 A1	06-05-2020	NONE	