CLAIMS

1. An energy guiding chain (1) having electrical detection of deterioration, wherein the energy guiding chain includes a number of chain links (7) forming a passage for protectedly guiding lines like cables, hoses or the like, between a first connection end (6) and a second connection end (5) moveable relative thereto, wherein adjacent chain links (7) are respectively connected together in the longitudinal direction hingedly or by a flexible connection, the energy guiding chain including an apparatus for detecting deterioration wear in a critical region (11) of at least one chain link (7), for example due to abrasion wear, cracking and/or fatigue breakage,

characterised in that

the apparatus (10) has a radio circuit (20, 20A, 20B; 1220; 1320…) and at least one detector element (26; 1226, 1227; 1626), which cooperates with the radio circuit, and in that the radio circuit and the cooperating detector element are integrated in a detection module (100; 190; 200) for original fitment or retro-fitment to the energy guiding chain (1) and the detection module (100; 190; 200) is fixed to the at least one chain link, wherein the detector element changes the behaviour of the radio circuit at a predetermined amount of wear in the critical region (11) so that that change due to deterioration wear can be wirelessly detected.

2. An energy guiding chain according to claim 1, characterised in that a number of chain links (7) in a wear-susceptible longitudinal portion of the energy guiding chain respectively have at least one detection module (100; 190; 200).

3. An energy guiding chain according to claim 1 or 2, characterised in that the detector element (26; 1226, 1227; 1626) is in the form of a line portion of a detector line (24; 1627) which extends in the critical region and which is interrupted at the predetermined amount of deterioration wear.

4. An energy guiding chain according to claim 3, characterised in that the radio circuit is a transponder (20) and includes an antenna (22; 122) which is short-circuited by way of the detector element (26) and that the detector element (26) opens the short-circuit at the predetermined amount of deterioration wear.

5. An energy guiding chain according to claim 1 or 2, characterised in that the radio circuit is a transponder (20) that includes an antenna and the detector element is in the form of a part of the antenna which extends in the critical region and which is interrupted at the predetermined amount of deterioration wear.

6. An energy guiding chain according to claim 4 or claim 5, characterised in that the antenna is in the form of an induction coil (22; 122) or in the form of a dipole antenna (1322; 1422; 1522).

7. An energy guiding chain according to one of claims 1 to 6, characterised in that the radio circuit is

- in the form of a passive RFID transponder (20, 20A, 20B; 1220; 1320…) with a microchip (21) which stores identification information; or
- in the form of an active RFID transponder (1510) having a microchip (1521) which stores identification information; or
- in the form of a passive 1-bit transponder, preferably with an LC oscillating circuit as the antenna for the radio frequency method .

8. An energy guiding chain according to claim 1, characterised in that the apparatus (810) for functional checking has at least one further independent test transponder (20B), the behaviour of which preferably does not change due to wear.

9. An energy guiding chain according to claim 1, characterised in that the chain links (7) each include oppositely disposed side plates (8), at least

some of the chain links have at least one transverse leg (9) connecting the side plates, and the detector element (26) is mounted to a wear-susceptible narrow side of a side plate (8) and preferably in that the detection module (100; 190; 200) cooperates with a connector on the chain link (7) for mechanical fixing.

10. An energy guiding chain according to claim 1, characterised in that the chain links each include a segment that is produced in one piece forms a passage for protectedly guiding lines like cables, hoses or the like, the segments, wherein adjacent segments (217) are respectively connected together in the longitudinal direction by a flexible connection (219).

11. An energy guiding chain according to one of the preceding claims, characterised in that a plurality of detector elements (26; 1226, 1227; 1626) are respectively arranged in critical regions (11) on a chain link or on adjacent chain links and cooperate with a common radio circuit, preferably an RFID transponder, with a microchip.

12. An energy guiding chain according to one of claims 1 to 10, characterised in that the detector element (26; 1226, 1227; 1626) is in the form of a passive circuit component or in the form of a conductor portion and cooperates with a common radio circuit, preferably an RFID transponder, with a microchip.

13. An energy guiding chain according to one of claims 1 to 12, characterised in that the chain links or segments respectively have in the critical region (11) an intended breaking point which triggers the detector element at the predetermined amount of wear, wherein the detector element (26; 1226, 1227) is preferably in the form of an electromechanical or electronic (1330) switching device.

14. An energy guiding chain according to one of claims 1 to 13, characterised in that the energy guiding chain has a lower run (3) and an

upper run (4) which is slidable in relation thereto or which is self-supporting and the radio circuit and the detector element cooperating therewith are arranged in a portion of the upper run (3).

15. A system for electrical detection of deterioration including a displaceable energy guiding chain according to claim 1 and a reading device (12) wirelessly cooperating with the radio circuit for wirelessly monitoring the radio circuit behaviour.

16. A system according to claim 15, including

- an emergency shutdown device for stopping the consumer supplied by the energy guiding chain;
- a data interface to a maintenance signalling system; and/or
- a data interface to a merchandise management system.

17. A detection module (100; 190; 200) for original fitment or retro-fitment to a line guide (1) with electrical detection of deterioration, including a radio circuit (20, 20A, 20B; 1220; 1320…) having an antenna and a detector element (26), and a housing (192; 292), in particular of plastic, having fixing members (193A, 193B; 293, 298) cooperating with the line guide (1) to fix the detection module (100; 190; 200) to the line guide (1), wherein the housing is of such a configuration that a region of the housing with the detector element (26) is exposed to a region (11) which is critical in relation to deterioration wear, wherein the fixing members (193A, 193B; 293, 298) preferably cooperate with transverse legs (9) or connectors thereof on side plates (8).

18. A detection module according to claim 17, characterised by a two-part radio circuit (10) which includes the radio circuit (20, 20A, 20B; 1220; 1320…), with a rigid first circuit portion (10A) in which the antenna is provided and a second circuit portion (10B) in which the detector element (26) is provided.

19. A detection module according to claim 17 or 18, characterised in that the radio circuit comprises a microchip and is an active radio circuit.

20. Use of a detection module (100; 190; 200) according to claim 17 for electrically detecting deterioration in a critical region of a displaceable line guide (1; 221), in particular deterioration due to abrasion wear, cracking and/or fatigue breakage,

wherein at a predetermined amount of deterioration wear the behaviour of a transponder (20, 20A, 20B; 1220; 1320…) arranged at the line guide (1; 221) changes and a reading device (12) or transceiver wirelessly detects said change for the purposes of triggering a maintenance message and/or an emergency stop.

21. An active line guide, in particular an energy guiding chain, characterised by a detection module according to one of claims 17 to 19 for deterioration wear detection.