CLAIMS

What we claim is:

1. A safety arrangement for use with a piece of equipment, the safety arrangement comprising:

a signal generating unit for generating an optical signal;

an elongate element to be disposed along, about, around or through the piece of equipment, the elongate element being capable of transmitting an optical signal; and

a signal detecting unit for detecting an optical signal;

the signal generating unit being connected to the signal detecting unit by the elongate element, such that the signal detecting unit is in optical communication with the signal detecting unit, the signal detecting unit being arranged to detect a change in the optical signal transmitted by the elongate element as a consequence of movement of the elongate element and, upon detection of the change in the signal, the detecting unit is configured to effect a change in the operation of the piece of equipment.

2. A safety arrangement as claimed in claim 1, wherein the piece of equipment is a conveyor belt.

3. A safety arrangement as claimed in claim 1, wherein the signal generating unit comprises a laser.

4. A safety arrangement as claimed in claim 1, wherein the signal detecting unit comprises a photo detector.

5. A safety arrangement as claimed in claim 1, wherein the elongate element comprises an optical fibre.

6. A safety arrangement as claimed in claim 5, wherein the optical fibre extends along a support cable.

7. A safety arrangement as claimed in claim 6, wherein the support cable is provided with protrusions.

8. A safety arrangement as claimed in claim 6, wherein the support cable is electrically conductive.

9. A safety arrangement as claimed in claim 1, wherein the elongate element comprises two optical fibres.

10. A safety arrangement as claimed in claim 1, wherein the detecting unit is, upon detection in the change of the optical signal, configured to directly affect the operation of the piece of equipment.

11. A safety arrangement as claimed in claim 1, wherein the detecting unit is, upon detection in the change of the optical signal, configured to indirectly affect the operation of the piece of equipment.

12. A safety arrangement as claimed in claim 1, wherein upon detection of the change in the signal, the detecting unit is configured to effect the prevention of the supply of power to the piece of equipment.

13. A safety arrangement as claimed in claim 1, wherein upon detection of the change in the signal, the detecting unit is configured to effect the prevention of movement of at least a part of the equipment.

14. A piece of equipment provided with a safety arrangement, the safety arrangement comprising:

a signal generating unit for generating an optical signal;

an elongate element to be disposed along, about, around or through the piece of equipment, the elongate element being capable of transmitting an optical signal; and

a signal detecting unit for detecting an optical signal;

the signal generating unit being connected to the signal detecting unit by the elongate element, such that the signal detecting unit is in optical communication with the signal detecting unit, the signal detecting unit being arranged to detect a change in the optical signal transmitted by the elongate element as a consequence of movement of the elongate element and, upon detection of the change in the signal, the detecting unit is configured to effect a change in the operation of the piece of equipment.

15. A method of affecting the operation of a piece of equipment, the piece of equipment being provided with an elongate element that is capable of transmitting an optical signal, and which is disposed along, about, around or through the piece of equipment, the method comprising:

sending an optical signal along the elongate element;

monitoring the optical signal sent along the elongate element for changes in the optical signal; and

if a change in the optical signal is detected as a consequence of movement of the elongate element, affecting the operation of the piece of equipment.

16. A method as claimed in claim 15, wherein the piece of equipment is a conveyor belt.

17. A method as claimed in claim 15, wherein the elongate element comprises an optical fibre.

18. A method as claimed in claim 15, wherein the detected change is a change in intensity of the optical signal sent along the elongate element.

19. A method as claimed in claim 15, wherein the detected change is a change in a wavelength of the optical signal sent along the elongate element.

20. A method as claimed in claim 15, wherein the detected change is a change in a time of flight of the optical signal sent along the elongate element.

21. A method as claimed in claim 15, wherein the detected change is a change in a polarisation state of the optical signal sent along the elongate element.

22. A method as claimed in claim 15, wherein two signals are sent along the elongate element.

23. A method as claimed in claim 15, wherein the detected change is a change in phase between the two signals.

24. A method as claimed in claim 15, wherein the signal is continuous.

25. A method as claimed in claim 15, wherein the signal comprises a plurality of pulses.

26. A method as claimed in claim 15, wherein affecting the operation of the piece of equipment comprises preventing power being supplied to the piece of equipment.

27. A method as claimed in claim 15, wherein affecting the operation of the piece of equipment comprises preventing movement of at least a part of the piece of equipment.

28. A safety arrangement for use with a piece of equipment, the safety arrangement comprising:

a signal generating unit for generating a pressure wave signal;

an elongate element to be disposed along, about, around or through the piece of equipment, the elongate element being capable of transmitting a pressure wave signal; and

a signal detecting unit for detecting a pressure wave signal; the signal generating unit being connected to the signal detecting unit by the elongate element, the signal detecting unit being arranged to detect a change in the pressure wave signal transmitted by the elongate element as a consequence of movement of the elongate element and, upon detection of the change in the signal, the detecting unit is configured to effect a change in the operation of the piece of equipment.

29. A method of affecting the operation of a piece of equipment, the piece of equipment being provided with an elongate element that is capable of transmitting a pressure wave signal, and which is disposed along, about, around or through the piece of equipment, the method comprising:

sending a pressure wave signal along the elongate element;

monitoring the pressure wave signal sent along the elongate element for changes in the pressure wave signal; and

if a change in the pressure wave signal is detected as a consequence of movement of the elongate element, affecting the operation of the piece of equipment.

30. A safety arrangement for use with a piece of equipment, the safety arrangement comprising:

a signal generating unit for generating an electrical signal;

an elongate element to be disposed along, about, around or through the piece of equipment, the elongate element being capable of transmitting an electrical signal; and

a signal detecting unit for detecting an electrical signal; the signal generating unit being connected to the signal detecting unit by the elongate element, such that the signal detecting unit is in electrical communication with the signal detecting unit, the signal detecting unit being arranged to detect a change in the electrical signal transmitted by the elongate element as a consequence of movement of the elongate element and, upon detection of the change in the signal, the detecting unit is configured to effect a change in the operation of the piece of equipment.

31. A method of affecting the operation of a piece of equipment, the piece of equipment being provided with an elongate element that is capable of transmitting an electrical signal, and which is disposed along, about, around or through the piece of equipment, the method comprising:

sending an electrical signal along the elongate element;

monitoring the electrical signal sent along the elongate element for changes in the electrical signal; and

if a change in the electrical signal is detected as a consequence of movement of the elongate element, affecting the operation of the piece of equipment.

32. A safety arrangement for use with a piece of equipment, the safety arrangement comprising:

an elongate element to be disposed along, about, around or through the piece of equipment, the elongate element being provided with a component sensitive to changes in magnetic fields which is fixed in position relative to the elongate element, the component being in communication with a monitoring apparatus; and

a magnet located adjacent to the elongate element; the monitoring apparatus being arranged to detect changes in the component sensitive to changes in magnetic fields as a consequence of movement of the component sensitive to changes in magnetic fields, and thus the elongate element, relative to the magnet, and, upon detection of that change in the component sensitive to changes in magnetic fields, the monitoring apparatus is configured to effect a change in the operation of the piece of equipment.

33. A method of affecting the operation of a piece of equipment, the piece of equipment comprising an elongate element disposed along, about, around or through the piece of equipment, the elongate element being provided with a component sensitive to changes in magnetic fields which is fixed in position relative to the elongate element, and a magnet located adjacent to the elongate element; the method comprising:

monitoring the component sensitive to changes in magnetic fields for changes in the magnetic fields; and

if a change in the component sensitive to changes in magnetic fields is detected as a consequence of movement of the elongate element, affecting the operation of the piece of equipment.

34. A safety arrangement for use with a piece of equipment, the safety arrangement comprising:

an elongate element to be disposed along, about, around or through the piece of equipment, the elongate element being provided with a magnet which is fixed in position relative to the elongate element; and

a component sensitive to changes in magnetic fields located adjacent to the elongate element and in communication with monitoring apparatus; the monitoring apparatus being arranged to detect changes in the component sensitive to changes in magnetic fields as a consequence of movement of the magnet, and thus the elongate element, relative to the component sensitive to changes in magnetic fields, and, upon detection of that change in the component sensitive to changes in magnetic fields, the monitoring apparatus is configured to effect a change in the operation of the piece of equipment.

35. A method of affecting the operation of a piece of equipment, the piece of equipment being provided with an elongate element disposed along, about, around or through the piece of equipment, the elongate element being provided with a magnet which is fixed in position relative to the elongate element, and a component sensitive to changes in magnetic fields located adjacent to the elongate element; the method comprising:

monitoring the component sensitive to changes in magnetic fields for changes in the magnetic fields; and

if a change in the component sensitive to changes in magnetic fields is detected as a consequence of movement of the elongate element, affecting the operation of the piece of equipment.