

The present invention relates to a transmission device for the remote control of winches for elevators or cars designed to carry goods or passengers, using electrical signals transmitted by the carrying cable.

A transmission device of this type is already known which allows the wire or radio links normally used for the remote control of winches, elevators or cars. One such device, which is described in patent document GB-2 109 136, employs transmission of signals by position modulation, with a relatively high fixed frequency carrier in the order of 40 kHz. Using such a carrier has the disadvantage that heavy losses are incurred along stretches which may exceed 100 metres, and there is also the risk of radioelectric radiation. Moreover, the number of commands is very limited, only six commands being possible. Nor can this type of device provide any security in terms of the level of the signal received.

It is the object of the present invention to overcome these drawbacks by providing a particularly reliable device which is simple in its design because it does not rely on a relatively high fixed frequency carrier.

To this end, this transmission device for the remote control of winches for elevators or cars for carrying goods or passengers, using electrical signals transmitted by the carrying rope, comprising, for transmitting and receiving, two coupling coils which respectively transmit and receive, each of said coupling coils, which are torus-shaped, surrounding the cable to form a transducer and respectively linked to a transmitting unit and a receiving unit, is characterised in that the transmitting unit incorporates, on the one hand, an encoder linked to a keyboard and transmitting alternating signals having a first or a second frequency, in the 300 to 3000 Hz band, according to the value of the binary number that is to be transmitted, and, on the other hand, a microphone, the encoder and the microphone being linked to the input of an amplifier stage whose output is connected to the transmitter coupling coil, and the receiving unit comprises an amplifier stage connected to the receiver coupling coil and supplying on the one hand a decoder operating on control relays, and on the other an earpiece.

According to a complementary feature of the invention, the receiving unit incorporates a differential pre-amplifier connected to the receiver coupling coil and the output of which is linked, via a band-pass filter, to the input of an automatic gain control level detector (compressor) which operates on the pre-amplifier, and the output of said level detector is in turn linked to an input of an amplifier whose output is linked to a second automatic gain control level detector (expander) which operates on the foregoing amplifier and the output of which supplies the earpiece and the decoder.

The transmission device according to the invention has the advantage that it operates at low frequency and consequently introduces only small losses in the metal cables, it creates little interference and does not generate radioelectric radiation. Moreover, telephonic transmission takes place at audio-frequencies, without requiring a carrier, thereby greatly simplifying the device. The automatic gain control level detectors provided in the receiving unit provide compensation dynamics of 10 000, which is indispensable on cable lengths of more than 30 metres. Moreover, the device allows transmission to take place using words of 8 bits, giving 128 possible commands, with a parity test on the transmitted word, thereby providing greater security.

One embodiment of the present invention will now be described, by way of example only, with reference to the accompanying drawing in which the single figure is a synoptical scheme of a transmission device according to the invention.

The device according to the invention is provided to perform transmission of signals suited to use in the remote control of a winch 1 used to move a load or car 2 by coiling or uncoiling a steel carrying cable 3. The transmission device includes a transmitting unit 4 linked to a transmitter coupling coil 5 and a receiving unit 6 linked to a receiver coupling coil 7. Each torus-shaped coupling coil 5, 7 surrounds the cable 3 to form a transducer. The steel carrying cable 3 forms a short-circuit secondary winding of a current transformer.

The transmitting unit 4 comprises an encoder 8 to which is linked a keyboard 8, and a microphone 11 of a telephone handset. The encoder 8 and the microphone 11 are linked to the input of a voltage amplifier 12 whose output is connected to the input of a power amplifier 13 linked by its output to the transmitter coupling coil 5.

The encoding of the information transmitted by the cable 3 and emitted by the encoder 8 is done by means of a classical system combining a hard-wired logic or a microprocessor with a series transmission system capable of operating modem or frequency-type transmission. The binary signals emitted by the encoder 8 are transmitted by frequency shifts using two frequencies in the 300 to 3000 Hz band. In other words, a "1" bit is represented by a signal having a first frequency contained in said band, whereas a "0" bit is represented by the second frequency.

The phonic link is achieved by direct modulation of the transmitter coupling coil 5 which forms a transducer, after the signal has been amplified and compressed, by an automatic gain control system which is common to the phonic link and the digital link.

The low frequency modulation applied by the current generator to the primary of the transducer, which is constituted by the transmitter coupling coil 5, thus produces a current in the cable 3 that is proportional to the conversion ratio and resistance of said cable 3. The cable plays the part of a magnetic core and increases the inductance.

At the receiving end, the receiving unit 6 uses a torus-shaped coupling coil 7 or a Hall effect sensor in order to restore the variations in magnetic field produced along the cable in the form of an electrical signal.

The receiving unit 6 incorporates a low-noise differential pre-amplifier 14 which is connected to the receiver coupling coil 7, then a band-pass filter 15 (the band passing from 300 to 3000 Hz), then an automatic gain control level detector 16 (compressor), and which operates on the pre-amplifier 14. The output of the level detector 16 is linked to an input of an amplifier 17 whose output is connected to an automatic gain control level detector 18 (expander) and which operates on the amplifier 17. Lastly, the output of the level detector 18 is linked on the one hand to the earpiece 19 of a telephone handset and on the other hand to a decoder 21 which operates on control relays 22.

The automatic gain control level detectors 16 and 18 are provided to take account of the fact that the dynamics of the signal received may vary in a ratio higher than 10 000.

Claims

1. Transmission device for the remote control of winches for elevators or cars (2) carrying goods or passengers, using electrical signals transmitted by the carrying cable (3), comprising, for transmitting and receiving, two coupling coils which are respectively a transmitting coil (5) and a receiving coil (7), each of said coupling coils, which are torus-shaped, surrounding the cable to form a transducer and respectively linked to a transmitting unit (4) and a receiving unit (6), characterised in that the transmitting unit (4) comprises, on the one hand, an encoder (8) linked to a keyboard (9) and transmitting alternating signals having a first or a second frequency, in the 300 to 3000 Hz band, according to the value of the binary number that is to be transmitted, and, on the other hand, a microphone (11), the encoder (8) and the microphone (11) being linked to the input of an amplifier stage (12,13) whose output is connected to the transmitter coupling coil (5), and the receiving unit (6) comprises an amplifier stage (14) connected to the receiver coupling coil (7) and supplying on the one hand a decoder (21) operating on control relays, and on the other a telephone earpiece (19).

2. Device according to Claim 1, characterised in that the receiving unit (6) comprises a differential pre-amplifier (14) connected to the receiver coupling coil (7) and the output of which is linked, via a band-pass filter (15), to the input of an automatic gain control level detector (16) (compressor) operating on the pre-amplifier (14), and the output of said level detector (16) is in turn linked to an input of an amplifier (17) whose output is linked to a second automatic gain control level detector (18) (expander) operating on the foregoing amplifier (17) and whose output supplies the earpiece (19) and the decoder (21).

