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	US 3501218	US 3985424
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(54) Remote viewing optical fibre cable systems

(57) A remote viewing system, for enabling an observer to observe a field of view which is not directly visible to him, incorporates a flexible light transmitting cable 26 comprising a bundle of parallel optical fibres and which terminates at its respective ends in respective light input/output devices 20, 34. One such device 20 is permanently disposed at a predetermined viewing position (e.g. outside a building) for viewing at that position by an observer, and the other such device (34) is permanently disposed at a predetermined position remote from said viewing position (e.g. inside the building) and is directed at a predetermined field of view (e.g. a meter dial) which cannot be seen directly by said observer when at said viewing position.

Such a system may also be applied to a road vehicle to provide for its driver, for example, a sideways view as seen from a position at the very front of the vehicle.

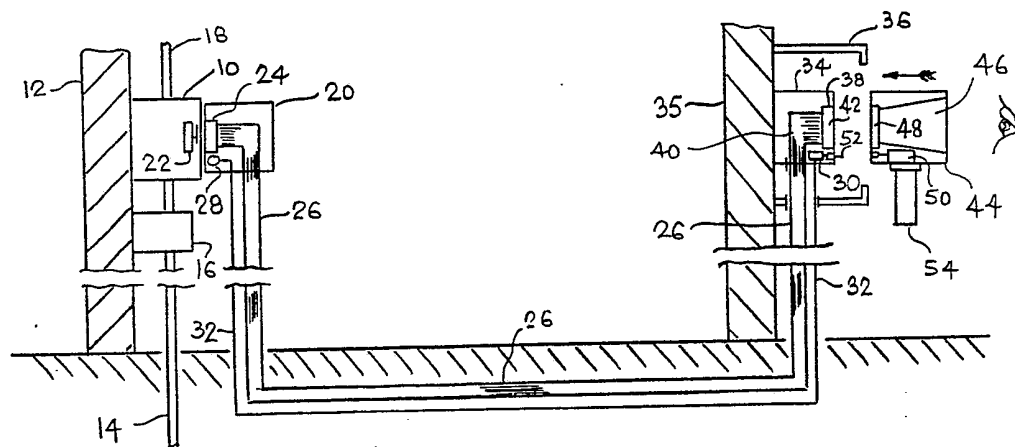


FIG. 1

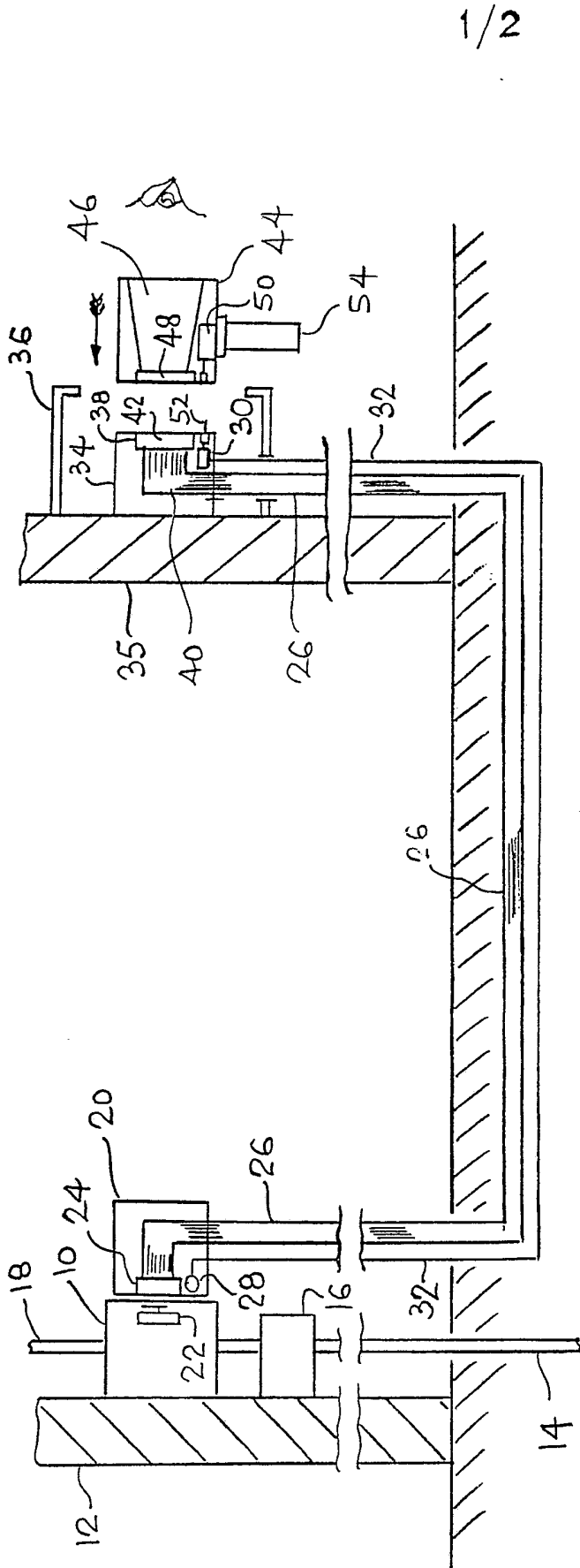


FIG. 1

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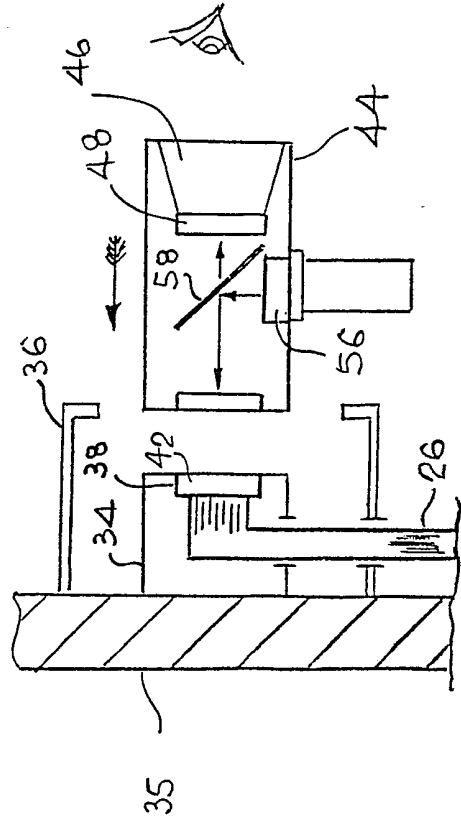


FIG. 2.

REMOTE VIEWING SYSTEMS

This invention relates to remote viewing systems,
particularly but not exclusively for reading electricity or
5 like meters, and for providing vehicle drivers with a better
view of traffic and road conditions around them.

Until recently, electricity, gas and water supply meters
were installed in a convenient location inside the premises
10 at the point of supply to the premises. To read such
meters, access to the premises by a meter reader was
necessary. In more recent times, such meters have been
installed externally of such premises in a weather-proof
enclosure. This obviated the need for gaining access to the
15 supplied premises in order to read the meters.

However, there still remain many domestic premises where the
meters are installed inside the premises, and where access
is thus necessary. Nowadays, many domestic premises are
20 left unattended during the working day, so that access is
more difficult to obtain, and return visits by meter readers
are more often required.

The present invention seeks to provide a simple and economic
25 way of overcoming that difficulty.

According to one feature of the present invention, a kit of
parts for facilitating the reading of meters installed
inside a premises comprises:

- 30 (a) an internal unit arranged for mounting on a meter and
having a local viewing aperture aligned with the dial of the
meter;
- (b) an external unit arranged for mounting externally of
the premises and having a remote viewing aperture disposed
35 at a convenient position for viewing by a meter reader; and
- (c) an optical fibre cable interconnecting the said
internal and external units and having its respective cable
ends positioned in the respective local and remote viewing

apertures.

With such a kit installed at a premises having an inside
meter, the meter may be read by a meter reader without the
5 need to gain access to the premises for that purpose.

The internal unit may include a local light source for
illuminating the meter dial, and that light source may be
powered from an electricity supply adjacent the meter.
10 Alternatively, the light source may be powered from a power
source in the external unit, via an electric cable which
likewise interconnects the internal and external units.

Alternatively, the external unit may incorporate such a
15 light source, and means for directing light therefrom into
the optical fibre cable whereby to illuminate the dial of
the meter at the far end of the optical fibre cable.

As a still further alternative, such a dial illuminating
20 light source (and associated power source) may be
incorporated instead in a portable viewing unit which is to
be carried around by the meter reader and coupled
temporarily with each said external unit in turn, whereby to
read the respective meters.

25 According to a further aspect of the present invention, a
meter reading system comprises a meter installed inside a
premises; a said internal unit mounted on the meter and
having its said local viewing aperture aligned with the dial
30 of the meter; a said external unit mounted externally of
the premises and having its said remote viewing aperture
disposed at a convenient position for viewing by a meter
reader; and an optical fibre cable interconnecting the said
internal and external units and having its respective cable
35 ends positioned in the respective local and remote viewing
apertures, so as to enable the meter reading to be viewed at
the said remote viewing aperture.

Other features of the present invention will be apparent from a reading of the description that follows hereafter, and from the claims appended at the end of that description.

5 One meter reading system according to the present invention will now be described by way of example and with reference to the accompanying diagrammatic drawings in which:

10 Figure 1 shows diagrammatically the system applied to a domestic dwelling house, in side elevation; and

Figure 2 shows in a similar elevation a modification of that system.

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Referring now to the Figure 1, a conventional electricity meter 10 is installed on an inside wall 12 of a house, being connected to an electricity supply cable 14 through mains fuses 16, and supplying the house wiring system 18.

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One unit (the internal one) 20 of a remote meter reading system is mounted on the front of the meter, and has covering the dial 22 of the meter a local viewing aperture 24 in which one end of an optical fibre cable 26 terminates. A light source 28 is incorporated in the unit 20 and when energised illuminates the meter dial. That light source may be energised by a local electricity supply circuit, or if desired from a remote supply source that will be mentioned later, in either case under the control of a remote switch 30 via a cable 32.

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The remote meter reading system also includes an external unit 34 which is secured on an external wall 35 of the house at a convenient height. That unit is enclosed in a weatherproof housing 36, and has a remote viewing aperture 38 in which the other end 40 of the optical fibre cable 26 terminates at a viewing screen 42. That unit also incorporates the said remote control switch 30 for

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controlling the energisation of the light source 28 in the internal unit 20.

5 After opening up the weatherproof housing 36, and operating the remote switch 30 to illuminate the meter dial (where necessary), a meter reader may observe the meter dial on the viewing screen 42.

10 If desired, in a modification of the system just described the meter reader is provided with a portable handset 44, as shown in the Figure 1. That handset incorporates at the end of a darkened convergent tunnel 46 a magnifying system 48 for enlarging the image of the meter dial, and a local power supply source 50 which may be connected with the cable 32 by
15 a plug and socket connection device 52 for energising the light source 28 of the internal unit 20 under the control of the switch 30. The handset is carried on a handle 54.

To accommodate instances where no light source 28 is
20 provided or where it is temporarily defunct, the handset may be as shown in the Figure 2. That handset is arranged to illuminate the meter dial 22. For that purpose, the handset is provided with a local light source 56, and an inclined, beam-splitting half-mirror 58, arranged on the one hand to
25 direct light from that light source 56 to the meter dial 22 via the optical fibre cable 26, and on the other hand to allow the meter reader to observe the dial 22 as seen on the viewing screen 42 via the optical fibre cable.

30 If desired, a scanning unit (not shown) may applied to the remote viewing aperture of the external unit, which scanning unit is arranged to convert the scanned image into a print-out of the meter dial reading.

35 The optical system herein proposed for the remote viewing of meter dials may be applied with advantage in other technical fields. For example, such local and remote viewing units interconnected by an optical fibre cable may be used with

5 advantage to provide a driver of a road vehicle with images of the road behind him, or more importantly at a road junction or cross roads, with images of a sideways view looking along the transverse road that joins or crosses the road on which he is temporarily waiting.

One embodiment of the present invention as applied to the field of road vehicles will now be described by way of example and with reference to the diagrammatic Figures 3-5.

10 Figure 3 shows a plan view of road junction;

Figure 4 shows, in a plan view, a remote viewing system applied to a motor car; and

15 Figure 5 shows, in a side view, the car having that remote viewing system installed thereon.

Referring now to the Figure 3, the driver of a car 10 arriving at a position 12 at the junction of two roads 14, 16 which together constitute a T-junction, has his sideways views obstructed by parked vehicles 18, 20. To join a traffic stream travelling along the transverse road 16, the driver has to carefully drive his car slowly forwards, until he has a sideways view sufficient to decide the moment at which he can safely turn into the transverse road.

By so moving his car forwards, the driver has placed himself in a hazardous position, with his car bonnet protruding into the on-coming traffic stream. Even if the park vehicles 18, 20 were not present, the driver still has to put himself into a similarly hazardous position before he can safely decide the moment at which to move his car into the on-coming traffic stream.

35 According to the present invention, the car is provided with a sideways-looking 'local viewing unit' 22 (see Figures 3 and 4), which is mounted in the region of and above the car

bumper 24 at a convenient position. That unit is disposed so as to observe the scene to the right of the car bonnet, and is connected through its optical fibre cable 26 to a 'remote viewing unit' 28, which is placed within the car cabin at a convenient position in front of the driver and above his normal line of sight when viewing the road ahead. Thus, the driver has, when glancing upwards at the remote viewing unit, a view looking to the right of the car bonnet.

10 If desired, a similar local viewing unit 30 is arranged in a back-to-back arrangement with the unit 22, so as to observe the scene to the left of the car bonnet. That unit 30 is connected by an optical fibre cable 32 to an associated remote viewing unit 34 which is mounted alongside the remote viewing unit 28 above the drivers normal field of forward view. Thus, the driver has, by glancing upwards, a sideways view looking to the left, as well as a sideways view looking to the right.

20 Thus, the driver of the car has an adequate sideways view looking in both directions along the transverse road, without having to put his car in a hazardous position.

If desired, other similar local viewing units 36, 38 may be substituted in place of the conventional wing and/or side mirrors. Such rearward looking viewing units are connected through optical fibre cables 40, 42 with associated remote viewing units 44, 46 which are likewise mounted within the car cabin alongside the remote viewing units 28, 34. Thus, by a simple upwards glance, the driver has within a small compass, in addition to the afore-mentioned sideways views to the right and left, rearward views to the left and right of his car.

35 The local viewing units may be arranged so as to give views similar to those provided by plane-surfaced mirrors, or otherwise views similar to those provided by curved-surfaced mirrors.

Such interconnected local and remote viewing units may be applied in a similar manner to any other form of vehicle for travelling on land, on the sea, or in the air.

5 Moreover, they may be used to provide for the driver of a vehicle other views from around the vehicle, for example, views which would be useful when the driver is attempting to park his vehicle in between other parked vehicles, or alongside a curb.

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Thus, a local viewing unit may be provided in the region of the rear bumper of a vehicle, to provide a view of the parking space available to the rear of the vehicle, whilst another local viewing unit could be placed on the nearside of the vehicle and arranged to give the driver of the
15 vehicle a view of the curb against which he is attempting to park his vehicle.

Kits each comprising such local and remote viewing units and
20 the associated optical fibre cable may be made and sold for factory fitting to new vehicles, or for subsequent fitting to new or second-hand vehicles.

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CLAIMS

1. A remote viewing apparatus comprising a flexible light transmitting cable comprising a bundle of parallel optical fibres and terminating at its respective ends in respective light input/output devices, one such device being arranged for permanent disposition at a predetermined viewing position for viewing at that position by an observer, and the other such device being arranged for permanent disposition at a predetermined position remote from said viewing position and being directed at a predetermined field of view which cannot be seen directly by said observer when at said viewing position, whereby said observer may observe said field of view via said light transmitting cable.

2. A remote viewing apparatus according to claim 1, wherein said other device is disposed adjacent an instrument so as to have within its field of view a dial or other means indicating the status or condition of the instrument, the instrument and said other device being disposed within a building or other enclosure, and wherein said one device is permanently disposed at a said viewing position outside said building, the arrangement being such that an observer at said viewing position may view said instrument dial without gaining access to said building.

3. A remote viewing apparatus according to claim 2, wherein there is provided a dial illuminating means disposed adjacent said dial for rendering it visible to said observer via said optical cable.

4. A remote viewing apparatus according to claim 3, wherein said dial illuminating means is controlled by a switch means disposed at said viewing position.

5. A remote viewing apparatus according to claim 3 or 4, wherein said dial illuminating means is energised from a supply source disposed at said viewing position.

6. A remote viewing apparatus according to claim 2, wherein there is provided a dial illuminating means disposed at said viewing position and arranged to illuminate said instrument dial via said optical cable.

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7. A remote viewing apparatus according to any preceding claim, wherein there is provided a magnifying means disposed at said viewing position for magnifying the image of the instrument as perceived via said optical cable.

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8. A building or other enclosure having a remote viewing apparatus according to any preceding claim.

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9. A remote viewing apparatus according to claim 1, wherein said other device is disposed at a predetermined position at the periphery of a road or other vehicle, and said one device is disposed within said vehicle within the field of vision of a driver of said vehicle, whereby said driver may observe via said optical cable a field of view which is not directly visible to him from the driver's position in said vehicle.

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10. A remote viewing apparatus according to claim 9, wherein said other device is disposed at the front of the vehicle and is arranged to have a field of view looking sideways of said vehicle.

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11. A remote viewing apparatus according to claim 9, wherein said other device is disposed at the side of said vehicle, and is arranged to have a field of view looking rearwards of the vehicle.

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12. A road or other vehicle having a remote viewing apparatus according to any one of the claims 9 to 11.

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13. A kit of parts for installing a remote viewing apparatus according to any one of the claims 1 to 7 in a building or other enclosure.

14. A kit of parts for installing a remote viewing apparatus according to any one of the claims 9 to 11 in a road or other vehicle.

5 15. A remote viewing apparatus, or a building having such an apparatus, substantially as hereinbefore described with reference to and as illustrated by the Figures 1 and 2 of the accompanying diagrammatic drawings.

10 16. A remote viewing apparatus, or a vehicle having such an apparatus, substantially as hereinbefore described with reference to and as illustrated by the Figures 3 to 5 of the accompanying diagrammatic drawings.

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