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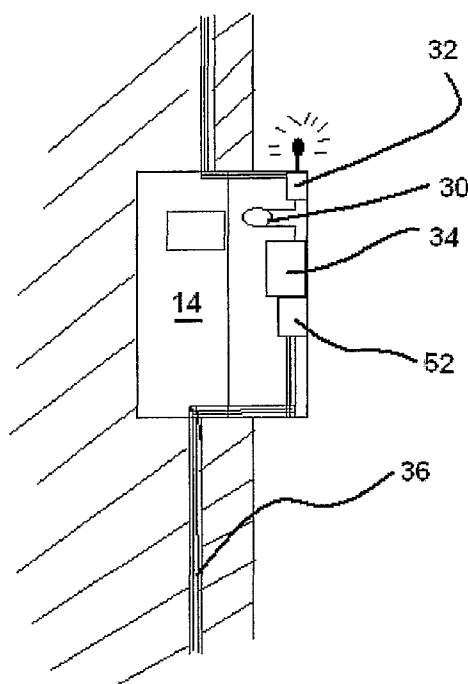


Figure 1

(57) Abstract: The invention provides a device and system for verifying and/ or managing services such as electricity, water and gas use remotely. The system includes a service meter or a device attachable to a service meter. The service meter or device includes a means for capturing a digital image of a meter reading and a transmitter for transmitting a signal to a remote station, which signal relates to the digital image of current reading of the meter.

WO 2009/043065 A2

REMOTE MONITORING SYSTEM

FIELD OF THE INVENTION

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This invention relates to a service meter or a device attachable to a service meter and a remote monitoring system.

BACKGROUND TO THE INVENTION

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The inventor has identified a problem for service providers such as electricity, water and gas service providers who rely on individual metering devices each located at premises of an industrial site or a residence or residential complex to calculate the monthly amount to be billed to the user of the services. The reading or
15 monitoring of the meters of the devices by a person requires large manpower and traveling expenses. Often the readings are inaccurate or taken at a date different to the billing date for the service, which leads to legal disputes.

It is one object of this invention to provide a service meter or a device
20 attachable to a service meter and a system for monitoring such meters which requires reduced manpower and traveling expenses.

The inventor also identified a further problem experienced by service providers, such as electricity service providers that they only have crude regional
25 power cutting means in the case of an overburdened power grid.

It is another object of the invention to provide a service management device and system for service providers which provide a means for selectively
30 managing users and/ or appliances of users.

The inventor also identified a problem experienced by service providers and service users in that they have crude means for monitoring service usage.

It is another object of the invention to provide a system for live monitoring service use level and its integration into a service provider management system.

- 5 It is another object of the invention to provide a system for service users to manage their service consumption.

SUMMARY OF THE INVENTION

- 10 According to one aspect of the invention, there is provided a service meter or a device attachable to a service meter, which service meter or device includes:

- a means for capturing a digital image of a meter reading;
and a transmitter for transmitting a signal to a remote station, which signal
15 relates to the digital image of current reading of the meter.

To avoid the high cost exercise of replacing old service meters with new service meters, in accordance with the invention, a device attachable to the service meter is preferable.

20

In the case of newly installed service meters, the service meter will include a service metering module, preferably an electronic service metering module.

- The means for capturing a current meter reading may be any digital imaging
25 device configured to capture a digital photographic image of the current reading of the meter.

- The digital image may be transmitted to a remote location with a processor where the signal may be processed for further use. Alternatively the service meter or
30 device attachable to a service meter may include a processor for processing the digital image into a format or signal recognizable by a remote station. The processor may be programmed to process the digital image by means of optical character recognition software to convert the image into text, binary and/ or numerical

characters for identification and calculation of service bills and database management purposes.

5 The service meter or device attachable to a service meter may include an internal clock so that the date and time of the reading can be included in the signal to a remote station. The clock may be self correcting or programmable to be synchronized or corrected from time to time.

10 Each service meter or device attachable to a service meter may include a unique identification means or code, which is incorporated in the image or signal.

15 It will be appreciated that disputes as to the amount, identity and time of the reading is to be avoided. It is also to be appreciated that both the remote monitoring and verification of a reading can be accomplished by the abovementioned device on a real time basis.

20 The service meter or device attachable to a service meter may include a power source. The power source may include rechargeable chemical cell. The power source may be obtained by means of a connection to the municipal power grid or a solar cell which provides power directly to the meter or device, or which maintains the rechargeable chemical cell in a sufficiently charged state.

25 The service meter or device attachable to a service meter may be manufactured in a sealed unit which is tamper resistant. The sealed unit may be a replacement cover for the service meter with the components of the device integrated into the cover.

30 The service meter may include a plurality of sensors arranged in communication with a remote location which sensors are configured to sense certain attributes, such as motion, tampering, unauthorized access and/or the like. It is to be appreciated that these attributes are generally associated with the predetermined parameters. The service may also be configured to reset any of the sensors upon instruction from a control center at the remote location to avoid triggering of alarms.

The processor may be configured or programmed to send a signal at a predetermined date and time or on a real time basis with regular intervals, or the device may include a receiver for receiving a remote signal, such as a request for a current reading.

5

The transmitter and/ or receiver of the device may be linked on the Ethernet, radio, satellite or a cell phone network and may be accessible by a person with the necessary access clearance to monitor the reading or usage of the service at any time.

10

The device may include a GPS transceiver and the location coordinates of the meter may accompany the signal.

15

The processor may be programmable by means of a remote signal which carries the reprogramming software.

20

According to a further aspect of the invention, there is provided a remote monitoring system, which system includes a service meter or a device attachable to a service meter as described above and a remote station, which remote station includes:

a receiver or transceiver for receiving a signal from the service meter or device, which signal carries the data of a digital image of the current meter reading; and

25

a remote processor configured to process the signal into a form readable and/ or displayed to a person.

30

The processor may further be configured to automatically produce an invoice or the system may be integrated into an existing accounting system and the processor may be configured to process the signal into a form recognizable by such an accounting system.

The system may include a storage means for storing the information or data.

The processor may be configured to monitor and/ or display current readings, usage or consumptions over a time period. The usage or consumption may be displayed graphically or in a statistically useful manner.

- 5 A photographic printout of the image of the meter reading, the time and date and unique code may accompany such an invoice.

- 10 The stored information or data on the storage means may be accessible to a user of the service and/ or the service provider *via* website based viewer. The website may be configured to allow access to a user with a pre selected username and/ or password. The user of service provider may monitor and read current readings, usage or consumptions over a time period and a reading at a selected time. The usage or consumption may be displayed graphically.

- 15 According to an even further aspect of the invention, there is provided a remote monitoring and management system, which system includes a monitoring system as described above and a service meter or a device attachable to a service meter as described above and which service meter or device also includes a receiver for receiving a remote signal and a processor for processing a received signal and a
20 switching means for switching a service or device on or off in response to a received signal.

It will be understood that the switch includes a valve for water or gas services.

- 25 The means for switching of appliances may include remote switches for such devices and the remote monitoring and management system may include a communication means between the processor and such switches. The communication means may be a modem configured to communicate to each switch through normal electrical wiring of a building.

30

The switching means may be accessible to a user of the service and/ or the service provider *via* website based viewer. The switching means may additionally or alternatively be accessible via a cellular phone.

Each device may be provided with an identification means such as a unique identification code. The identification codes may be classed into regional groups from a single house, street, suburb, city, up to the borders of the country in which the service provider operates. The service provider can then manage, on a first level, service usage of groups on a regional basis of different sizes. The regional service usage can then also be, on a second level, further classed into halting of full services or by cutting power on an appliance lever, in the case of electrical services. On a third level, a user can manage own power usage. The management of each level may be controlled by a dedicated processor.

The system can also include a processor and modem located at a central point such as a transformer for a region such as a street which processor communicates with devices fitted to service meters or service meters located at a premise such as a house.

The invention has several advantages. Remote reading of service meters reduces manpower and costs. The image of the reading at a specific date and time eliminates inaccuracies and disputes due to real time monitoring. Consumers and service providers can check the actual physical reading of a service meter. A consumer can monitor the rate of usage of a service at a specific time or over a period of time. Property transactions or changes between service providers requires hand over of service accounts, which is usually guessed for a specific time which can be inaccurate within a few days and the system provides a record of the reading of the meter at a specific time, which can be used to provide an accurate record at the time of handover. The system can also be used to calculate the debtors' book value of the service provider at a specific point in time. The system provides a photographic image of the physical reading of a service meter together with time and date, which accompanies the invoice or bill for the service. The system also allows a user to monitor usage of a service in real time or over a time period and any abnormalities such as earth leakage of electricity, water or gas leakage can be detected by a user and fixed.

Additionally, the invention provides a means to manage and control service usage by the service provider and the service user. The service provider can

manage service usage such as power usage on a geographical level to an individual appliance in a building while a user can also optimize his power usage and switch appliances on or off remotely.

- 5 Additionally, the service provider can use the system and device to provide the service on a pre-paid basis. Effectively, the device can turn any service meter into a pre-paid type service meter. This may be very useful for landlords.

- 10 Further, no changes to the existing service infrastructure are required to implement the system according to the invention. The device and system can be added to existing meters without replacement of the need for wiring or rewiring.

- 15 Even further, it will be possible for service providers to use the data to isolate illegitimate use or leakage of a service.

- 20 Still further, if the communication between a service provider and the devices to be attached to a service meter or service meters, in accordance with the invention, is interrupted it will indicate loss of infrastructure, such as cable theft.

- 25 Also, the system lowers wear and tear on electrical switch gear since power to an area, house or appliance is interrupted without manipulation of switchgear.

The system can also be used in a modular way.

25

BRIEF DESCRIPTION OF THE DRAWING

The invention is now described, by way of a non-limiting example, with reference to the accompanying drawings wherein

- 30 Figure 1, in diagrammatic view, shows a device attachable to a service meter, in accordance with the invention;

Figure 2, in diagrammatic view, shows a remote monitoring system, in accordance with the invention;

Figures 3 to 7 shows, by example, diagrams of different possible configurations of the device and system, in accordance with the invention.

In Figures 3 to 7 the following key is used:

1. Camera
2. Cable Control Unit
3. General Packet Radio Service
4. Electrical Service Meter
5. Power Line Modem
6. Substation

DETAILED DESCRIPTION OF THE INVENTION

With reference to the accompanying drawing, a remote monitoring system, in accordance with the invention, is generally indicated by reference numeral

10.

The system 10 includes a device 12 attachable to an electrical supply service meter 14 of a house 13 and a remote station 16.

The device 12 includes a means for capturing a current meter reading in the form of a digital image camera 30 and a transceiver 32 for transmitting a signal 20 to the remote station 16, which signal relates to the current electrical service use reading of the meter 14. The device 12 further includes a clock and processor 34 for processing the digital image of the reading into a signal recognizable by a remote station 16 and which signal carries the data of the reading, the date and time and a unique code in the form of a picture or address of the house 13 in question photographed together with the meter reading.

The device 12 attachable to a service meter includes a power source 36 in the form of the electrical wiring 36 of the house 13 and a chemical power cell (not shown), which cell is kept in a sufficiently charged state.

The device 12 attachable to a service meter 14 is manufactured in a sealed unit which is tamper resistant and includes a accelerometer (not shown) arranged in

communication with the remote station 16, which accelerometer is configured to sense motion, tampering or unauthorized access and signal such an event to the remote station 16.

5 The remote station 16 includes a transceiver 18 for receiving a signal 20 via a relay station 22 from the device 12, which signal carries the digital photographic image data of a current meter reading. The remote station 16 further includes a processor 24 configured to process the signal 20 to be displayed in a readable format on a display 26 to a person.

10

 The system 10 also includes a storage means 38 in the form of data storing hard drive server for storing the information or data. The stored information or data on the storage means is accessible to a user 40 of a service and the service provider *via* website based viewer 42. A website is configured to allow access to a user with a
15 pre selected username and password. The user 40 of service provider can monitor and read current readings, usage or consumptions over a time period and a reading at a selected time. The usage or consumption over time is also displayed graphically.

20 The transceiver 32 for transmitting a signal 20 to the remote station 16 is also configured to receive a remote signal 20 and the processor 34 is also configured for processing the received signal for switching a geyser 48 on or off in response to a received signal, by actuating a switch 46. The processor 34 and the switch 46 communicates by means of a modem 52 configured to communicate to the switch 46
25 through the normal electrical wiring 36 of the house 13. The switch 46 is accessible to the user *via* the website based viewer 42. The switch 46 is additionally accessible to a user via a cellular phone 50.

 The device 12 also includes an override switch (not shown) to switch off the
30 power supply to the house 13 or individual appliances such as the geyser 48. The override switch is accessible to the service provider at the remote station 16.

 Although only one embodiments of the invention has been described herein, it will be understood by any person skilled in the art that other modifications, variations,

and possibilities of the invention are possible. Such modifications, variations and possibilities are therefore to be considered as falling within the spirit and scope of the invention and hence forming part of the invention as herein described and/or exemplified.

5

It will also be appreciated that the system mentioned in the example can easily be adapted to or used as is to provide the advantages mentioned in the general description of the invention.

10

It shall further be understood that the example is provided for illustrating the invention further and to assist a person skilled in the art with understanding the invention and is not meant to be construed as unduly limiting the reasonable scope of the invention.

15

CLAIMS

1. A service meter or a device attachable to a service meter, which service meter or device includes:
5 a means for capturing a digital image of a meter reading;
and a transmitter for transmitting a signal to a remote station, which signal relates to the digital image of the current reading of the meter.
2. A service meter or device as claimed in Claim 1, which includes a
10 processor for processing the digital image into a format or signal recognizable by a remote station.
3. A service meter or device as claimed in Claim 2, wherein the processor
15 is programmed to process the digital image by means of optical character recognition software to convert the image into text, binary and/ or numerical characters.
4. A service meter or device as claimed in any one of the previous claims,
wherein the service meter or device includes an internal clock and wherein the date and time of the reading is included in the signal to a remote station.
20
5. A service meter or device as claimed in any one of the previous claims,
wherein the service meter or device includes a unique identification means or code, which is incorporated in the image or signal.
- 25 6. A device as claimed in any one of the previous claims, wherein the device is manufactured in a sealed unit which is tamper resistant and forms a replacement cover for a service meter with the components of the device integrated into the cover.
- 30 7. A device as claimed in any one of the previous claims, which includes a plurality of sensors arranged in communication with a remote location.
8. A device as claimed in any one of the previous claims, wherein the processor is configured to send a signal selected from a predetermined date and

time, on a real time basis with regular intervals, and the device or meter including a receiver for receiving a remote signal upon a request signal.

9. A device as claimed in any one of the previous claims, wherein the
5 transmitter and/ or receiver of the meter or device are linked to a network.

10. A device as claimed in any one of the previous claims, wherein the
device includes a GPS transceiver and the location coordinates of the meter
accompanies a signal.

10

11. A device as claimed in any one of the previous claims, wherein the
processor is programmable by means of a remote signal which carries the
reprogramming software.

15 12. A remote monitoring system, which system includes a service meter or
a device attachable to a service meter as claimed in any one of the claims above and
a remote station, which remote station includes:

a receiver or transceiver for receiving a signal from the service meter or
device, which signal carries the data of a digital image of the current meter reading;
20 and

a remote processor configured to process the signal into a form readable and/
or displayed to a person.

25 13. A remote monitoring system as claimed in Claim 12, wherein the remote
processor is configured to automatically produce an invoice.

14. A remote monitoring system as claimed in Claim 12, wherein the
system is integrated into an existing accounting system and the processor is
configured to process the signal into a form recognizable by such an accounting
30 system.

15. A remote monitoring system as claimed in any one of claims 12 to 14,
wherein the system includes a storage means for storing the information or data.

16. A remote monitoring system as claimed in any one of the previous claims 12 to 15, wherein the processor is configured to monitor and/ or display current readings, usage or consumptions over a time period.

5 17. A remote monitoring system as claimed in any one of the previous claims 13 to 16, wherein a photographic printout of the image of the meter reading, the time and date and unique code accompanies such an invoice.

10 18. A remote monitoring system as claimed in any one of the previous claims 15 to 16, wherein the stored information or data on the storage means is accessible to a user of the service and/ or the service provider *via* website based viewer.

15 19. A remote monitoring and management system, which system includes a monitoring system as claimed in any one of claims 12 to 18 and a service meter or a device attachable to a service meter as claimed in any one of claims 1 to 11 wherein the service meter or device also includes a receiver for receiving a remote signal and a processor for processing a received signal and a switching means for switching a service or device on or of in response to a received signal.

20 20. The remote monitoring and management system as claimed in claim 19, wherein the means for switching of a device includes remote switches for such devices and the remote monitoring and management system includes a communication means between the processor and such switches.

25 21. The remote monitoring and management system as claimed in claim 20, wherein the communication means is a modem configured to communicate to each switch through normal electrical wiring of a building.

30 22. A remote monitoring and management system as claimed in any one of the previous claims 19 to 121, wherein the switching means is accessible to a user of the service and/ or the service provider *via* website based viewer.

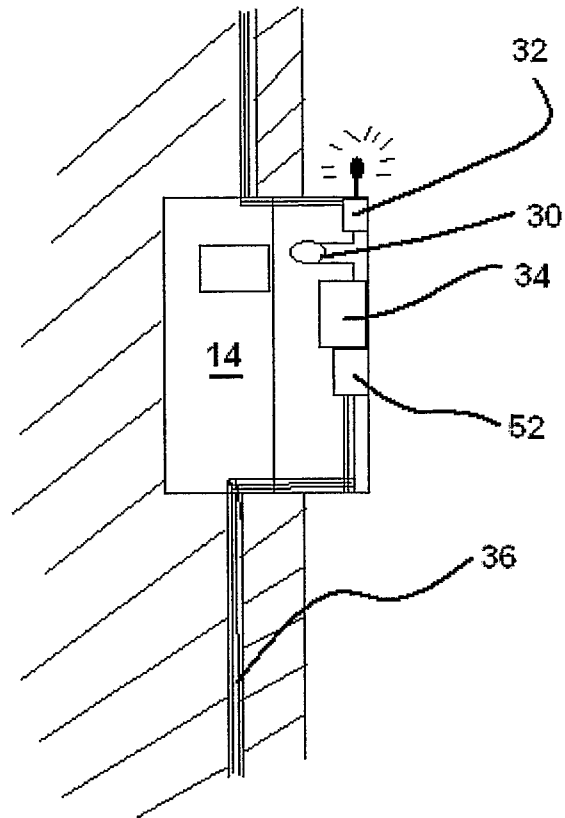


Figure 1

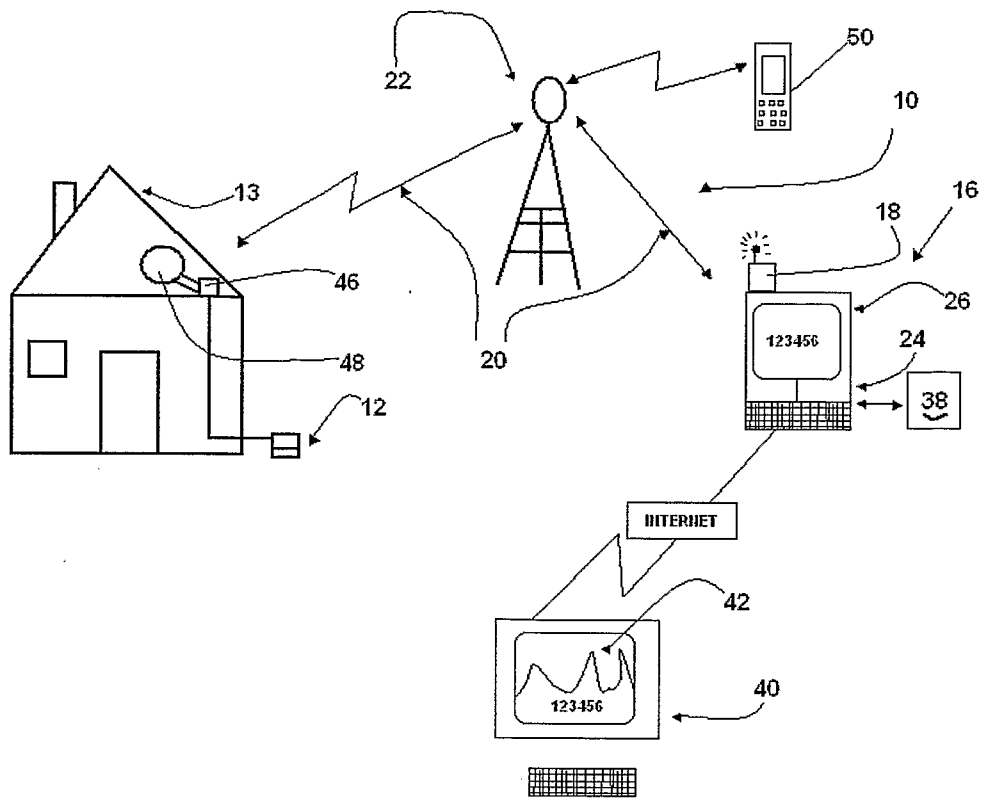
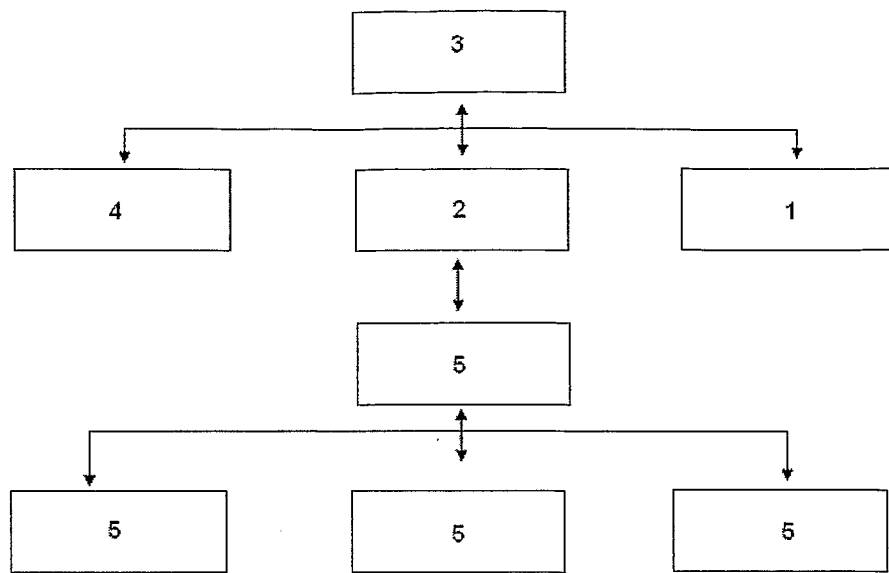
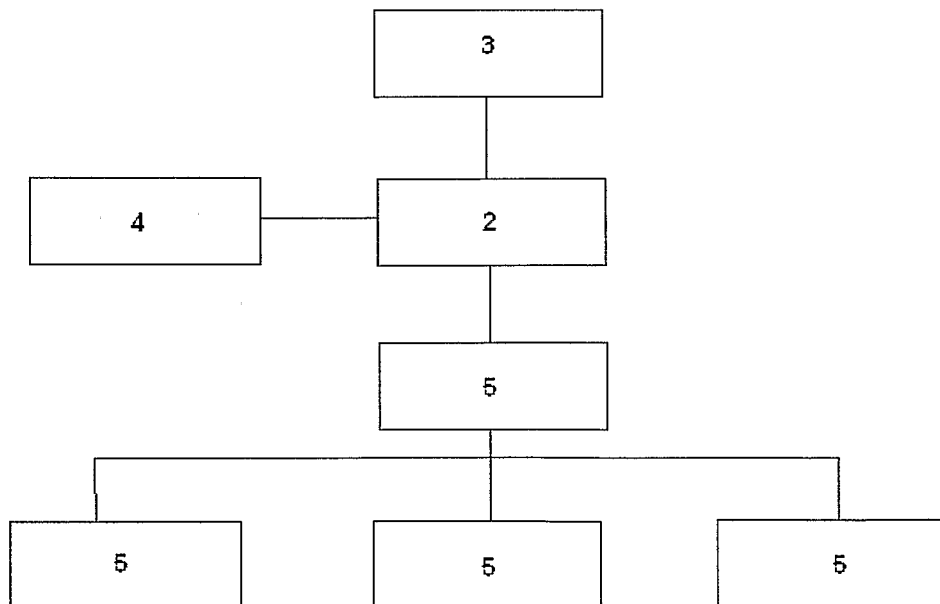


Figure 2

**FIGURE 3****FIGURE 4**

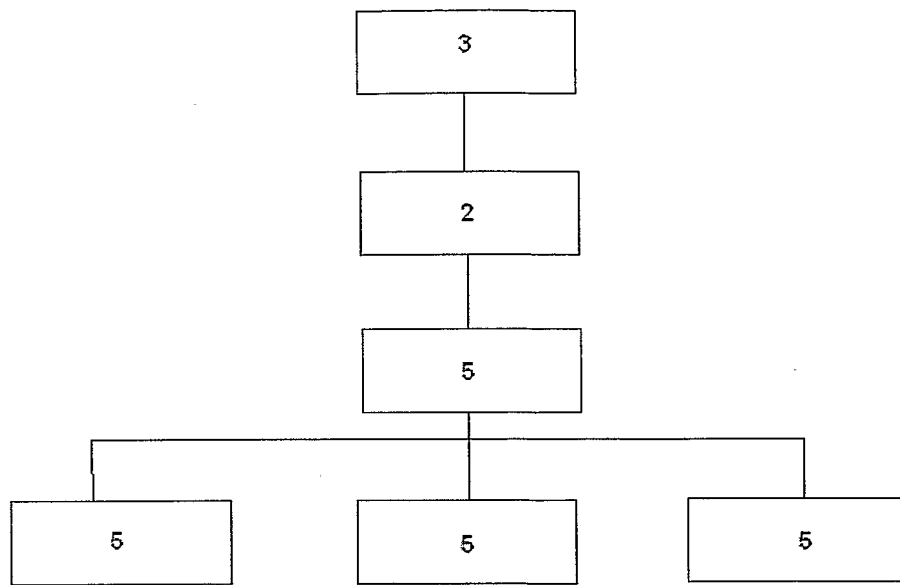


FIGURE 5

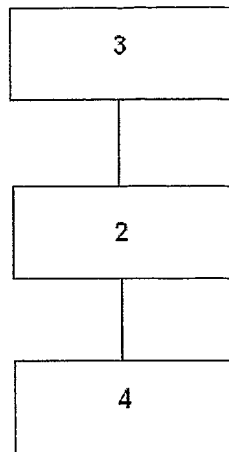


FIGURE 6

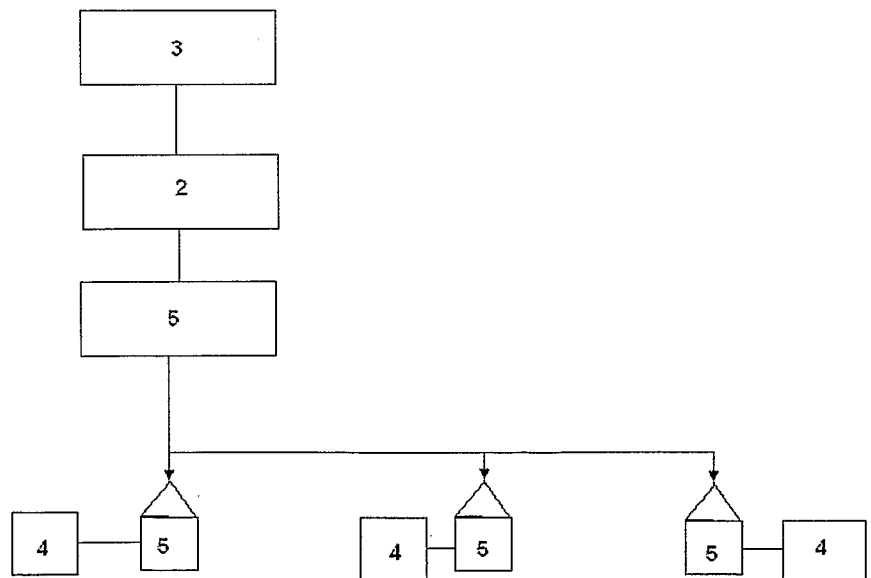


FIGURE 7

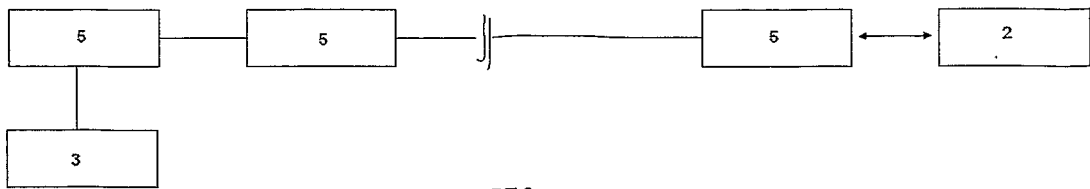


FIGURE 8