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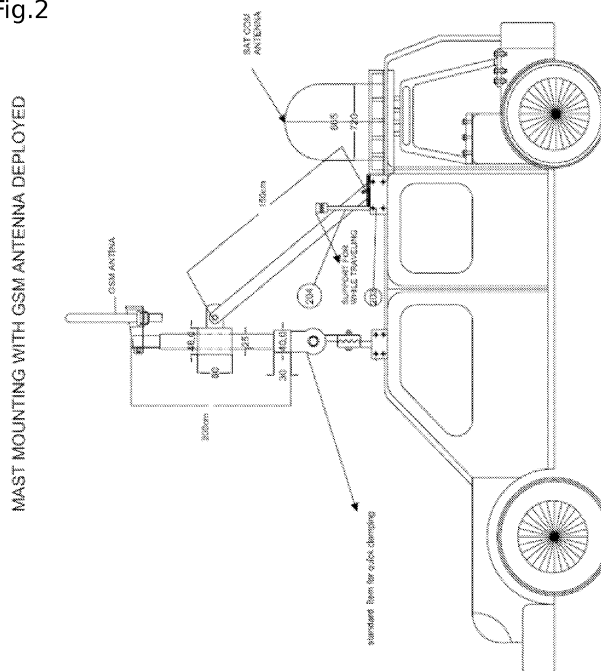
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(54) **Design of rapidly deployable mast mounting assembly with gsm antenna for the provision of mobile coverage for a moving convoy using satellite - bts- to- bsc link.**

(57) The invention refers to a design of rapidly deployable mast mounting assembly with GSM antenna for the provision of mobile coverage for a moving convoy using satellite - BTS- to- BSC link.

Fig.2



Description

TECHNICAL FIELD

[0001] The present invention relates to Design of Rapidly Deployable Mast Mounting Assembly With GSM Antenna for the provision of Mobile Coverage for a moving Convoy using Satellite - BTS- to- BSC link.

BACKGROUND ART

[0002] Mobile communication Service is provided all over the world by Global System for Mobile Communication (GSM). This Service allows both speech and Data to be communicated across the interconnected network. It is made possible through a chain of Base Transceiver Station (BTS) and a Base Station Controller (BSC). The BTS consists of communication equipment for providing Wireless communication between Mobile Station (customer handset) and the GSM Network. BTS is normally having a huge tower mounted with Communication antenna and associated Transmit /Receive equipments in an enclosure. Each BTS covers certain fixed cell area only. In order to have wide coverage, the number of BTS has to be increased. It is not economical to provide more BTS to cover the entire area; hence coverage is designed only for more populated area. When the customer is in the vicinity of this coverage area communication is possible. The signal transmitted by the handset (Mobile station) is picked up by the BTS and transmitted back to the GSM network, so as to reach the desired customer at the distant end. Similarly the signal transmitted back from the BTS is received at the handset and the communication link with the distant customer is established.

[0003] When a subscriber is in need of mobile communication out side this coverage area, the existing system fails to provide communication. Then the only way to provide communication under this condition is either to move the BTS along with the traveler or establish more BTS or Roaming arrangement with other operators. In this set up BTS moving is not possible due to its fixed nature. In the prior art BTS is not moveable from its fixed position. Hence the GSM antenna and its mounting were not moved. To provide a moving coverage, the GSM antenna with its mount has to be moved along with the traveler.

[0004] Some of the problems and drawbacks in connection with the prior art are hereinafter briefly summarized.

[0005] BTS (Base Transceiver Station) is operated in fixed location and is not movable in the conventional system. Hence the coverage limited to defined cell area only. In order to provide uninterrupted communication, large network of BTS are required all over the area to be covered. This is economically not viable. If the subscriber goes out of the coverage area, communication using GSM is impossible. To keep the subscriber connected, the BTS with its coverage has to be moved along with

the traveler.

[0006] In the prior art movement was not possible due to fixed nature of GSM mast and the Antenna mounting. So the main defect is the GSM Mast cannot be used for moving environment.

BRIEF SUMMARY OF THE INVENTION

[0007] The existing Global System Mobile communication provides the means of communication to people on the move locally and internationally by way of roaming arrangement with different mobile operators across the globe. Coverage is also limited with the individual operator. In the new invention, Mobile communication is provided to the subscriber through the same domestic operator either from local or international destination. No roaming arrangement is required with any other operator. The convoys moving to various locations can access his domestic network by using this system. Coverage is always made available by moving BTS simultaneously with the convoy. To create a moving cell coverage pattern radiating Omni antenna has to move as part of the moving BTS.

[0008] The new in this invention is the simplicity of Mast mounting. Mast can be easily assembled and disassembled with out using any external tools. Mast with GSM antenna deployment on top of the vehicle is possible with in short time. Mast balancing & holding in vertical position is achieved using two tie rods. The entire system can be folded back and stored on the vehicle top with simple locking and unlocking mechanism.

DETAILED DESCRIPTION OF THE INVENTION

[0009] Global System Mobile communication (GSM) is used all over the world as the means of communication to people on the move. Roaming arrangement is made with other operators across the globe to provide communication to the travelers who are out of their domestic network. This is also limited to a predefined territory decided by the particular mobile operator. Communication is lost when the subscriber is out of this particular territory. To make it more clear, GSM service is provided all over the world, from fixed BTS. Base Transceiver Stations (BTS) are controlled by Base Station Controllers (BSC). The BTS covers only predefined location. Handover between BTS is carried out when the customer moves out from one location to other. This is because of the limited cell coverage. But when there is no BTS cell coverage, communication is lost practically.

[0010] The new invention provides an effective solution for the above problem and communication is made possible while moving anywhere. The idea is conceived for providing mobile communication solution for the convoy moving to various destinations. The convoy is always linked to their domestic network operator through Satellite - BTS- to- BSC link. This idea can be utilized to meet the requirement of any potential customer.

[0011] The technique adopted for providing mobile coverage is based on our expertise in Satellite communication and GSM applications. It is decided to combine these technologies together to provide a viable solution on the move. The basic idea is to provide uninterrupted coverage, creating a coverage pattern using a single BTS which is moving with the traveler. This BTS is always linked through satellite to the assigned BSC at the home destination.

[0012] By incorporating the technology of Satellite Communication, BTS- to- BSC link and technique of satellite tracking, achieved a practical solution to implement the above idea successfully.

[0013] Mobile coverage is provided to the customer irrespective of his location. The system is capable of transmitting voice/data to the public network through Satellite -BTS- to- BSC link. In order to create a moving coverage pattern to follow the convoy, a moving BTS with the traveler is designed in a transportable vehicle. A 4-Wheel drive vehicle is selected for implementing the design so that it can move easily in any uneven terrain.

[0014] The basic principle of implementing mobile coverage moving with convoy is shown in Figure 1. The BTS is housing the radio transceivers which transmits and receives signal on the cells allocated frequencies. This in turn communicates with its BSC at the home location through the satellite link as shown in Figure 1. The BSC Manages the radio resource of the BTS and also the connection between the Mobile station (MS) and the external network subsystem. The BSC is interconnected to the Mobile Switching Center (MSC). It acts as the normal switching node for the mobile subscriber or land line telephone in the home network. The detailed description of the schematic in Figure 1 is provided in the subsequent section.

[0015] The signal transmitted from the Mobile station (MS) 101 is picked up by the GSM Omni Antenna 102 as shown in Figure 1. The signal is processed by the Micro BTS 103 and is passed to the satellite modem 104. The modem output, the Intermediate Frequency (IF) signal is up converted and amplified by the Block Up Converter (BUC) in TX System 105 to the desired satellite communication frequency band. The signal is transmitted through the Satellite communication Antenna 106 inside the radome 205. The antenna automatically tracks and lock to the satellite to maintain the communication link. The Signal received at the distant Earth station 107, is fed to Earth Station receive system 108, where it is down converted and demodulated to the desired base band frequency. The base band signal is transmitted to its base station controller (BSC) 109. There the signal is processed and switched to the Public network 110, so as to reach the desired subscriber 111. The reverse process takes place for receiving the signal by the transportable vehicle. Received signal is re transmitted by the Omni antenna to the customer handset 101, who is within the radiating range of the Micro BTS.

[0016] The signal transmission and reception from the

handset is achieved through an omni antenna mounted on a GSM mast, which acts as the interface between the BTS and customer handset .The coverage area depends on the height of the mast and the antenna. So the mounting of the GSM mast and Antenna has great importance. In normal situation The GSM Antenna is mounted on a GSM tower. In the case of a moving vehicle, it is not possible to - 4a - mount such a tower for fixing the Antenna. It is necessary to have an alternate solution to solve this problem. So a mast with light weight and good stiffness has been selected. This is mounted on top of the vehicle.

[0017] The Design is made in such a way that it has a center pole 201 holding the GSM Omni antenna 102 with two supporting movable tie rods 205 on a sliding mechanism 202 which holds the antenna in vertical position and prevents swinging and swaying while on the move. The design of the Mast assembly is so simple that no extra tool is required for the mast deployment. It is operated manually. Locking and unlocking 204 can be carried without any additional tool. Tie rod is fixed on a mounting plate 203. The mast mounting is designed for quick deployment with minimum integration time. It is easy to fold back with the help of tie rods when the system is not in use. Adequate care is taken to with stand wind force, shock and vibration. The hollow design of the center pole 201 allows the antenna cable routing to the communication equipment. GSM antenna is mounted on the top of the mast with an additional fixing arrangement as shown in Figure 3 and the connecting cable terminated in an attached junction box 206. The sliding tie rod can be unscrewed and the entire assembly including the mast, antenna and supporting rod can be folded on the top of the vehicle under non deployed condition as shown in Figure 4.

[0018] An Omini Antenna 102 is selected to have coverage in all direction which is mounted on top of the Mast for signal pickup. The design implementation is shown in the Figure 2. An efficient and effective positioned omni antenna is essential to cover the designated Area. So the antenna is vertically mounted which picks up the GSM signal from the Mobile Station and fed to the Micro BTS for onward transmission. Similarly the received signal from Micro BTS is transmitted back to the subscriber. So the Antenna mounted on a mast with appropriate supporting mechanism is shown in Figure 3. This is essential for effective communication between the subscriber and moving BTS.

[0019] It will be hereinafter described how to use the invention.

[0020] This is a self-contained Communication solution for providing mobile connectivity irrespective of conventional GSM Coverage, extremely useful for convoy moving to different destinations with out depending on any local mobile operator for their immediate use. This compliments the absence of GSM coverage and provides instant communication facility to any motorable locations using the cell coverage area of the BTS on the vehicle.

Provision of mobile coverage for the moving convoy is achieved using Satellite- BTS to BSC link. This is highly useful to provide communication to the desired destination with the same domestic operator. This provides the roaming facility with out any other service provider. Since All the Communication equipments are accommodated compactly in a transportable vehicle, it can be easily transported anywhere to establish communication link with short notice.

[0021] The Mount can be easily assembled on moving platform to fix the Communication Antenna. The mechanism is very simple and light weight. Balancing is achieved by using two tie rods which supports the main pole. The tie rod together with main pole forms a balanced tripod. No external tool is required for assembling and disassembly. It can be easily integrated to any vehicle roof top with in short time and can be deployed very quickly. It takes only very little space due to elegant design. This is useful for any moving platform to fix antenna and keep it in upright condition to withstand wind force, shock and vibration.

[0022] Mobile coverage is provided to the customer irrespective of his location. The system is capable of transmitting voice/data to the public network through Satellite -BTS- to- BSC link. In order to create a moving coverage pattern to follow the convoy, a moving BTS with the traveler is designed in a transportable vehicle. A 4-Wheel drive vehicle is selected for implementing the design so that it can move easily in any uneven terrain.

[0023] The basic principle of implementing mobile coverage moving with convoy is shown in Figure 1. The BTS is housing the radio transceivers which transmits and receives signal on the cells allocated frequencies. This in-turn communicates with its BSC at the home location through the satellite link as shown in Figure 1. The BSC Manages the radio resource of the BTS and also the connection between the Mobile station (MS) and the external network subsystem. The BSC is interconnected to the Mobile Switching Center (MSC). It acts as the normal switching node for the mobile subscriber or land line telephone in the home network. The detailed description of the schematic in Figure 1 is provided in the subsequent section.

[0024] The signal transmitted from the Mobile station (MS) 101 is picked up by the GSM Omini Antenna 102 as shown in Figure 1. The signal is processed by the Micro BTS 103 and is passed to the satellite modem 104. The modem output, the Intermediate Frequency (IF) signal is up converted and amplified by the Block Up Converter (BUC) in TX System 105 to the desired satellite communication frequency band. The signal is transmitted through the Satellite communication Antenna 106 inside the radome 205. The antenna automatically tracks and lock to the satellite to maintain the communication link. The Signal received at the distant Earth station 107, is fed to Earth Station receive system 108, where it is down converted and demodulated to the desired base band frequency. The base band signal is transmitted to

its base station controller (BSC) 109. There the signal is processed and switched to the Public network 110, so as to reach the desired subscriber 111. The reverse process takes place for receiving the signal by the transportable vehicle. Received signal is re transmitted by the Omni antenna to the customer handset 101, who is with in the radiating range of the Micro BTS.

[0025] The signal transmission and reception from the handset is achieved through an omni antenna mounted on a GSM mast, which acts as the interface between the BTS and customer handset. The coverage area depends on the height of the mast and the antenna. So the mounting of the GSM mast and Antenna has great importance. In normal situation The GSM Antenna is mounted on a GSM tower. In the case of a moving vehicle, it is not possible to mount such a tower for fixing the Antenna. It is necessary to have an alternate solution to solve this problem. So a mast with light weight and good stiffness has been selected. This is mounted on top of the vehicle.

[0026] The Design is made in such a way that it has a center pole 201 holding the GSM Omni antenna 102 with two supporting movable tie rods 205 on a sliding mechanism 202 which holds the antenna in vertical position and prevents swinging and swaying while on the move. The design of the Mast assembly is so simple that no extra tool is required for the mast deployment. It is operated manually. Locking and unlocking 204 can be carried with out any additional tool. Tie rod is fixed on a mounting plate 203. The mast mounting is designed for quick deployment with minimum integration time. It is easy to fold back with the help of tie rods when the system is not in use. Adequate care is taken to with stand wind force, shock and vibration. The hollow design of the center pole 201 allows the antenna cable routing to the communication equipment. GSM antenna is mounted on the top of the mast with an additional fixing arrangement as shown in Figure 3 and the connecting cable terminated in an attached junction box 206. The sliding tie rod can be unscrewed and the entire assembly including the mast, antenna and supporting rod can be folded on the top of the vehicle under non deployed condition as shown in Figure 4.

[0027] An Omini Antenna 102 is selected to have coverage in all direction which is mounted on top of the Mast for signal pickup. The design implementation is shown in the Figure 2. An efficient and effective positioned omni antenna is essential to cover the designated Area. So the antenna is vertically mounted which picks up the GSM signal from the Mobile Station and fed to the Micro BTS for onward transmission. Similarly the received signal from Micro BTS is transmitted back to the subscriber. So the Antenna mounted on a mast with appropriate supporting mechanism is shown in Figure 4. This is essential for effective communication between the subscriber and moving BTS.

[0028] Naturally, without altering the principle of the invention, the embodiments and constructional details may be widely varied with respect to what has been de-

scribed and illustrated, purely by way of a non-limiting example, without thereby departing from the scope of the invention which is defined in the accompanying claims.

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Claims

1. Designing of mounting arrangement for the mast with GSM Antenna on top of a vehicle to provide mobile coverage for a moving convoy using Satellite -BTS -to -BSC link. 10
2. Designing of mounting arrangement for the mast with GSM antenna of claim 1 where in the mast is fitted with two tie rods which will slide over the mast up to pre defined position to keep the mast in upright position. 15
3. Designing of mounting arrangement for the mast with GSM antenna of claim 1 where in the mast with tie rods designed as a tripod to balance the mast on top of the vehicle 20
4. Designing of mounting arrangement for the mast with GSM antenna of claim 1 wherein the mast deployment is rapid with out additional tools. 25
5. GSM antenna signal cable is terminated on junction box which is mounted on the mast. 30
6. The mast with GSM Antenna is stowed and secured with foldable and supporting mechanism on top of the vehicle when system is not in use.

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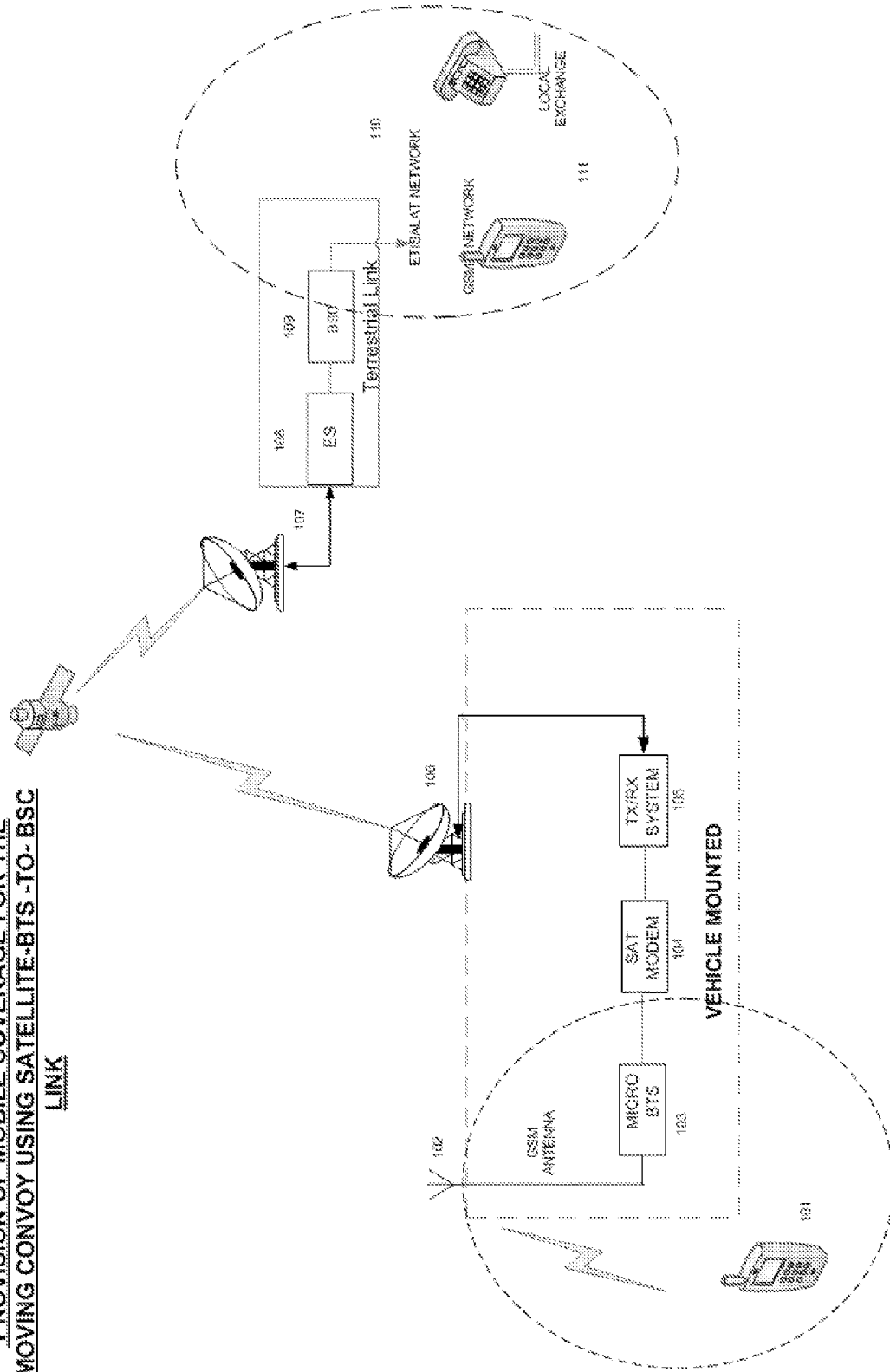
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**PROVISION OF MOBILE COVERAGE FOR THE
MOVING CONVOY USING SATELLITE-BTS -TO- BSC
LINK**



MAST MOUNTING WITH GSM ANTENNA DEPLOYED

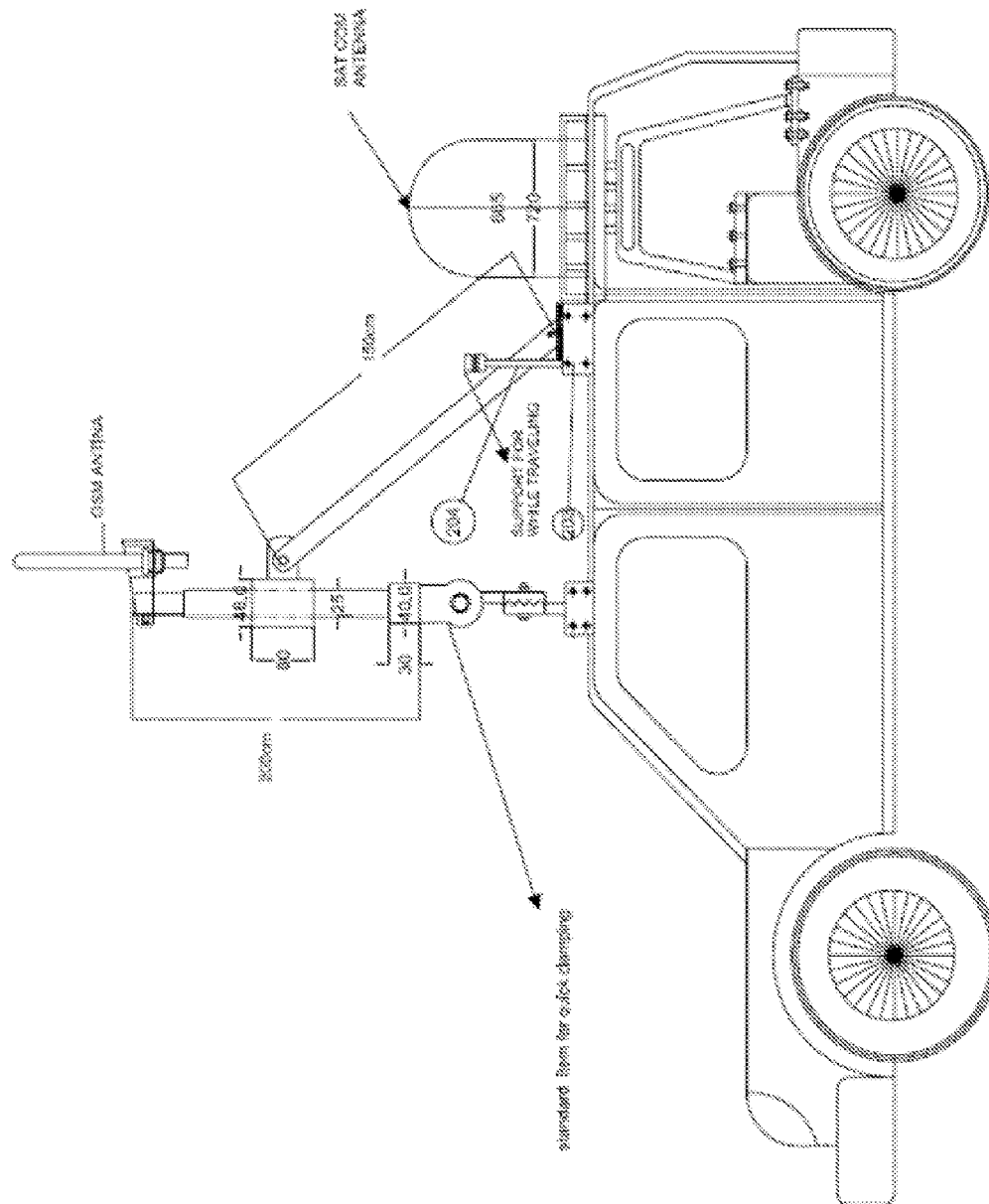
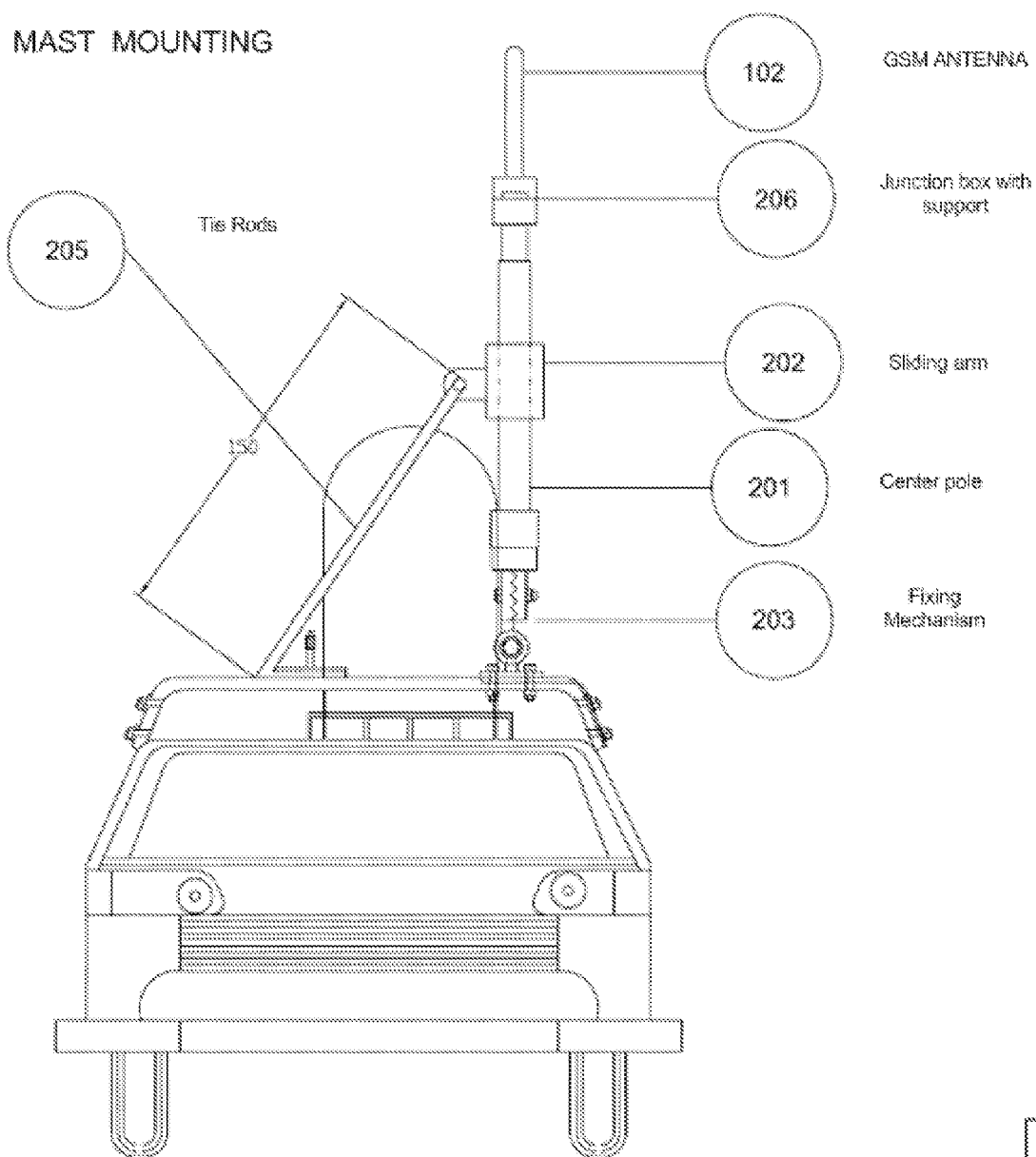
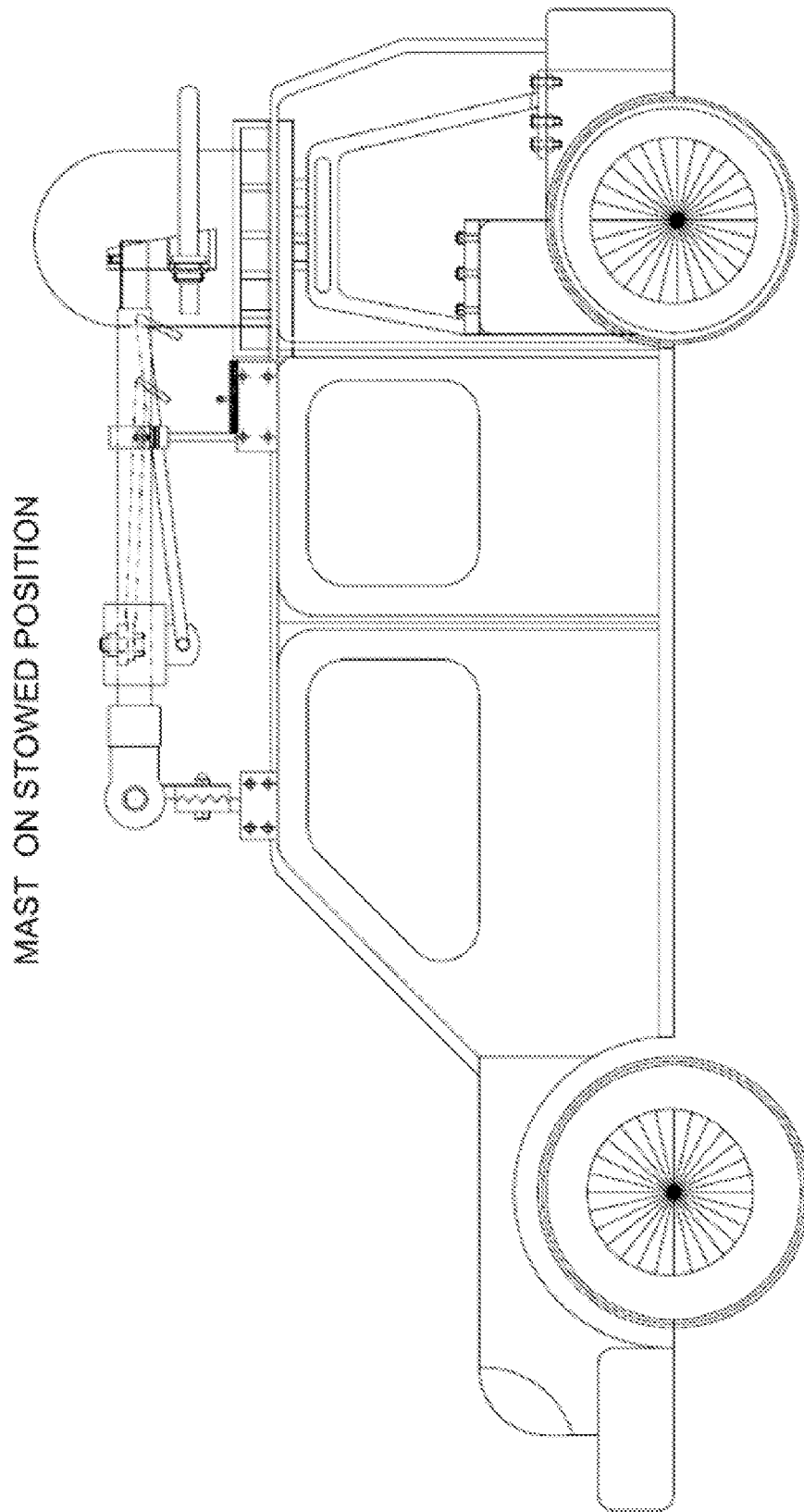


FIG. 3







EUROPEAN SEARCH REPORT

Application Number
EP 11 16 8725

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The present search report has been drawn up for all claims			
Place of search The Hague		Date of completion of the search 7 November 2011	Examiner Fredj, Aziz
CATEGORY OF CITED DOCUMENTS X : particularly relevant if taken alone Y : particularly relevant if combined with another document of the same category A : technological background O : non-written disclosure P : intermediate document T : theory or principle underlying the invention E : earlier patent document, but published on, or after the filing date D : document cited in the application L : document cited for other reasons & : member of the same patent family, corresponding document			

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**ANNEX TO THE EUROPEAN SEARCH REPORT
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This annex lists the patent family members relating to the patent documents cited in the above-mentioned European search report. The members are as contained in the European Patent Office EDP file on
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