the directional antenna 402 through the directional antenna interface 506. Then the process goes to step S1006.

In step S1006, the processor determines whether communication with the selected satellite has been successfully established. If the communication with the selected satellite has not been established, the process goes to step S1012. If the communication is successfully established, the process goes to step S1008. In step S1012, the processor 500 increments a count and then goes to step S1014. In step S1014, the processor 500 determines whether the count has exceeded a maximum. If the count exceeded a maximum, the process goes to step S1036 and outputs an ending message to the calling party that communication cannot be established. Then the process goes to step S1038 and ends the communication process. If the count has not exceeded a maximum, the process returns to step S1012.

In step S1008, the selected satellite receives information from the portable satellite phone 102 and determines the appropriate destination satellite if the destination satellite is other than the selected satellite. Then the process goes to step S1010. In step S1010, the destination satellite (which could be the selected satellite) determines whether the number dialed by the calling party is the number for the portable satellite phone, portable satellite phone 104, for example. If the number is the number for the portable satellite phone 104, then the process goes to step S1022 to reach the called party by directly contacting the portable satellite phone 104. Otherwise, if the number dialed by the calling party is the number connected to a ground based communication network 200, then the process goes to step S1016.

In step S1022, the destination satellite outputs a signal to alert the called party that a call is pending.

Then the process goes to step S1024. In step S1024, if the portable satellite phone 104 is in standby mode (e.g., not busy), then the portable satellite phone 104 alerts the called party that a call is pending. Then the process goes to step S1026.

In step S1026, the process waits for a predetermined time for the called party to answer the call through the portable satellite phone 104. If the called party answers the call within the predetermined amount of time, the process goes to step S1032. Otherwise, the process goes to step S1030. In step S1030, the destination satellite informs the selected satellite that the called party has failed to answer the call. The selected satellite in turn informs the calling party that the call is not answered in an ending message. Then the process goes to step S1038 and ends the communication process.

In step S1032, the portable satellite phone 104 establishes communication with the destination satellite by determining the position of the destination satellite and the position of the portable satellite phone 104 and forms a directed beam to the destination satellite. Then the process goes to step S1034. In step S1034, the calling party and the called party are connected in a call. After the call is completed, the process goes to step S1038 and ends the communication process.

In step S1016, the destination satellite establishes communication with a ground based communication network 200. Then the process goes to step S1018. In step S1018, the ground based communication network connects the call to a terminal such as a terminal 202 or a mobile phone 204 of the called party and goes to step S1020. In step S1020, the process waits for a predetermined amount of time for the called party to answer the call. If the called party answers the call then the process goes to step S1028. Otherwise, the

process goes to step S1030. In step S1028, the calling party and the called party are connected in a call. After the call is completed, the process goes to step S1038 and ends the communication process.

After the portable satellite phones 102 and 104 establish communication with the respective satellites, each of the respective portable satellite phones 102 and 104 continues to monitor the positions of the portable satellite phones 102 and 104 and the respective satellites. The respective processors 500 continue to adaptively adjust the direction of the antenna beams so that the antenna beams are aimed at the respective satellites irrespective of the movement of the calling or called parties and the movement of the respective satellites.

In the event that the selected destination satellites are other than GEO satellites, the possibility exists for the respective satellites to move out of range of the respective portable satellite phones 102 and 104. If the selected/destination satellites move out of range, the portable satellite phones 102 and 104 must identify another satellite to continue the communication path by consulting the respective databases so that the call may continue without interruption. After identifying another satellite, the portable satellite phones 102 and 104 may transition from the original or first selected/destination satellites to the new or second selected/destination satellites by either a snap beam technique or a bridge beam technique.

Figure 15 shows a diagram of the snap beam technique that may be used to transition or "hand-off" from a first satellite 802 to a second satellite 804. As shown in Fig. 14, the portable satellite phone 800 communicates with the first satellite 802 through antenna beam 806. Before the first satellite 802 goes out of range, the portable satellite phone 800 determines the

position of the second satellite 804 and, at an appropriate moment, transitions the communication path from antenna beam 806 to antenna beam 808 in the direction of 810. Thus, the antenna beam is snapped from a direction of antenna beam 806 to a direction of antenna beam 808 transitioning the communication path from the first satellite 802 to the second satellite 804.

Figure 16 shows a second possible method for transitioning between a first satellite 812 and a second satellite 814. The portable satellite phone 820, for example, communicates with the first satellite 812 through antenna beam 822. When the first satellite 812 is moving out of range, the portable satellite phone 820 locates the second satellite 814 and converts the antenna beam 822 into a bridge beam 824 that permits communication with both the first and second satellites 812 and 814. When the communication path transition from the first satellite 812 to the second satellite 814 is completed, the bridge beam 824 is converted to a narrow beam 826 aimed directly at the second satellite 814. Thus, the transition between the first and second satellites 812 and 814 may be achieved without interrupting the communication between the calling and the called parties.

For hand-offs between LEO, ICO or MEO 308, 306 and 312 satellites, the beam bridging technique is generally more widely applicable, since no precise timing coordination between the satellite network 100 and the antenna phones 800 and 820 is required. A bridging beam can be directed at both satellites 800 and 820 for seconds or minutes to ensure a seamless hand-off. The snap beam hand-off between adjacent satellites 802 and 804, for example, requires some timing coordination between the satellites 802 and 804 and the portable satellite phones 800 and 820. Alternately, the snap beam technique with the satellites 802 and 804 bridging the signal across both

satellites 802 and 804 would obviate the need for precision hand-off timing.

Figure 17 shows a flowchart of the process of transitioning between a first satellite and a second satellite by the portable satellite phone 102. In step S2000, the portable satellite phone 102 receives an instruction to establish communication with a satellite. Then the process goes to step S2002. In step S2002, the processor 500 determines whether the user is a calling party or a called party. If the user is a calling party, the processor 500 goes to step S2004. Otherwise, the first satellite is the destination satellite and the processor 500 goes to step S2006. In step S2004, the processor 500 selects a first satellite from the satellite network 100. Then the processor 500 goes to step S2006.

In step S2006, the processor 500 determines the first satellite position and goes to step S2008. In step S2008, the processor 500 forms and adaptively maintains an antenna beam directed at the first satellite. Then the processor 500 goes to step S2010. In step S2010, the processor 500 establishes communication with the first satellite and goes to step S2012. In step S2012, the processor 500 determines whether it is necessary to switch to a second satellite. If it is necessary to switch to a second satellite, the processor 500 goes to step S2014. Otherwise, the processor 500 goes to step S2030. In step S2030, the processor determines whether the communication between the calling and called parties is completed. If the communication between the calling and called parties is completed, the processor 500 goes to step S2032 and ends the process. Otherwise, the processor 500 returns to step S2012.

In step S2014, the processor 500 determines a second satellite position. Then the processor 500 goes to step S2016. In step S2016, the processor 500 determines whether to utilize the snap or beam bridge process. If the

processor 500 decides to use the snap beam process, the processor 500 goes to step S2024. Otherwise, the processor 500 goes to step S2018.

In step S2024, the processor 500 concludes the communication with the first satellite. The processor 500 may determine the timing for concluding the communication with the first satellite and begin the snap hand-off process or alternatively, the processor 500 receives a synchronization signal from the first satellite that initiates the snap hand-off process. The the processor 500 goes to step S2026. In step S2026, the processor 500 forms and adaptively maintains an antenna beam directed at a second satellite. Then the processor 500 goes to step S2028. In step S2028, the processor 500 establishes communication with the second satellite and goes to step S2030.

In step S2018, the processor 500 expands the antenna beam directed toward the first satellite into a bridging beam between the first and second satellites and goes to step S2020. In step S2020, the processor 500 transitions the communication from the first satellite to the second satellite and goes to step S2022. In step S2022, the processor 500 narrows the bridging beam into an antenna beam directed at the second satellite and adaptively maintains the antenna beam toward the second antenna. Then the processor 500 goes to step S2030.

Figure 18 shows a flowchart of a response of the portable satellite phone 102 to an object that comes into a beam path neighborhood of the antenna beam. In step S3000, the processor 500 forms an antenna beam and establishes communication with a satellite. Then the processor 500 goes to step S3002. In step S3002, the processor 500 activates the proximity detector along a beam path neighborhood. A beam path neighborhood is determined by a predetermined distance from the antenna.

beam and the portable satellite phone 102. Then the processor 500 goes to step S3004.

In step S3004, the processor 500 determines whether an object has entered into the beam path neighborhood. If an object has not entered into a beam path neighborhood, the processor 500 goes to step S3008. Otherwise, if an object has entered into the beam path neighborhood, then the processor 500 goes to step S3006. In step S3008, the processor 500 determines whether the communication between the calling and called parties has completed. If the communication has completed, the processor 500 goes to step S3016 and ends the process. Otherwise, the processor 500 returns to step S3004.

In step S3006, the processor 500 determines whether alternative antenna beam paths are available. If alternative beam paths are available, then the processor 500 goes to step S3010. Otherwise, the processor 500 goes to step S3012. In step S3010, the processor 500 reshapes the antenna beam to move the communication to a new beam path so that the beam path neighborhood avoids the object that entered the original beam path neighborhood. This process may include switching to another satellite. Then the processor 500 goes to step S3004.

In step S3012, the processor 500 reduces the beam power of the antenna beam and then goes to step S3014. In step S3014, the processor 500 activates the alarm device to alert the user and/or the object that entered into the beam path neighborhood of potential harm. Then the processor 500 goes to step S3004.

Figure 19 shows a diagram of a communication system that includes fixed phased array antennas 908, 910, 926 and 928 that are fixed to permanent structures 904, 906, 922 and 924, respectively. The permanent structures 904 and 906 are located in the Northern Hemisphere such as the United States 902, while the permanent structures 922 and 924 are located in the Southern Hemisphere such as in

Australia 920. Phased arrays 908 and 926 may be planar phased arrays mounted on structures such as houses and phased arrays 910 and 928 may be volumetric phased arrays mounted on towers such as for terrestrial wireless transmitters/receivers.

The fixed phased array antennas 908, 910, 926 and 928 may form directed antenna beams. For example, the phase array antenna 908 may form beams 916 and 918; the phased array antenna 910 may form antenna beams 912 and 914; the phased array antenna 926 may form beams 934 and 936; and the phased array 928 may form beams 930 and 932. The phased array antennas 908, 910, 926 and 928 form the respective directed beams toward satellites such as satellites 938, 940, 942 and 944 that may have orbits along the equator 950. Other satellites that have other orbits may also be reached by the fixed array antennas 908, 910, 926 and 928.

The above-described phased array antenna systems that are attached to permanent structures may be used for satellite cable TV and broadband terrestrial links such as multimedia direct satellite and wireless cable. Using the electronically steerable phased array antennas 908, 910, 926 and 928, installation of the phased array antenna facilities may be simply locating the antennas in a general direction facing the satellites. Thus, the phased array antennas 908, 910, 926 and 928 eliminate the need for complex mechanical installations where the antennas must be carefully aimed at destinations and sources. These fixed phased array antennas provide at least two unique benefits: simple, auto-steering during installation for ease of use, and terminal access to multiple satellite services.

In addition, the antenna systems may either receive users' location/address (latitude and longitude) or alternatively use built-in GPS localization to compute a correct steering direction to electronically steer

antenna beams for optimum reception. Further, the electronically-steered antennas can be redirected under user control for aiming antenna beams at selected satellites to take advantage of terrestrial service nodes. Thus, using a single, electronically-steered antenna system permits the user to receive service for multiple systems.

Moreover, fixed phased array antennas 908, 910, 926 and 928 that transmit signals using directed or non-directed beams may also apply proximity detection of objects that may be harmed by the electromagnetic energy. If objects are detected, alternative actions may be taken by redirecting the antenna beam, reducing the power of transmitted electromagnetic energy and/or activating an alarm to warn of possible harm.

While this invention has been described in conjunction with specific embodiments thereof, it is evident that many alternatives, modifications and variations will be apparent to those skilled in the art. In particular, while portable satellite phones 102 and 104 have been described by way of example, this invention is applicable to other devices such as cars and airplanes that may benefit from forming highly directed antenna beams to conserve power and to reach destinations such as other satellites or other receiving devices. In addition, although the above embodiments are described in conjunction with a portable satellite phone, the invention is applicable to other devices such as facsimile devices.

For simple embodiments, the portable satellite phones 102 and 104 may include a simple compass and level to assist users in orientating the portable satellite phones 102 and 104. These simple instruments provide rough attitude and bearing information for the user so that the portable satellite phones 102 and 104 may be properly and approximately orientated at night or in a dense fog situation, for example.

Also, the alarm device 408 may include a mechanical alarm such as a vibrator. This additional alarm mode enables hearing and/or vision impaired users to be alerted of antenna beam interference conditions.

Accordingly, preferred embodiments of the invention as set forth herein are intended to be illustrative, not limiting. Various changes may be made without departing from the spirit and scope of the invention as defined in the following claims.

WHAT IS CLAIMED IS:

1. A portable terminal, comprising:

a directional antenna; and

an antenna controller coupled to the directional antenna, wherein the antenna controller forms an antenna beam of the directional antenna and determines a direction of the antenna beam based on information generated by the portable terminal to allow the portable terminal to communicate with the satellite.

2. The portable terminal of claim 1, wherein the antenna controller directs the antenna beam of the directional antenna in the direction determined by the antenna controller to communicate with the satellite.

3. The portable terminal of claim 1, further comprising:

a steering information-determining device, wherein the steering information-determining device generates steering information including a position, a bearing and an attitude of the portable terminal.

4. The portable terminal of claim 3, wherein the steering information-determining device comprises:

a Global Positioning System signal receiver that receives Global Positioning System signals; and

steering information sensors that include at least one of a compass, a gyroscope, a plumb line and an attitude sensor.

5. The portable terminal of claim 3, wherein the antenna controller maintains the antenna beam of the directional antenna toward the satellite based on a position of the satellite and the steering information of the portable terminal generated by the steering information-determining device.

6. The portable terminal of claim 5, further comprising a database, wherein the antenna controller determines the position of the satellite based on at least

one of data retrieved from the database and position data received from the satellite.

7. The portable terminal of claim 6, further comprising a clock, wherein the antenna controller determines the position of the satellite by generating orbital information based on the retrieved data and the clock.

8. The portable terminal of claim 5, wherein the antenna controller transitions from communicating with the satellite to communicating with another satellite by one of snapping the antenna beam and bridging the antenna beam.

9. The portable terminal of claim 8, wherein the antenna controller snaps the antenna beam from the satellite to the another satellite at a time determined by one of the antenna controller and a synchronization signal from the satellite.

10. The portable terminal of claim 8, wherein the antenna controller broadens the antenna beam to communicate with the satellite and the another satellite simultaneously, the antenna controller reforming the broadened antenna beam to direct the antenna beam toward the another satellite at a time determined by at least one of the antenna controller, the satellite and the another satellite.

11. The portable terminal of claim 1, further comprising:

a proximity detector, wherein the antenna controller adjusts one of a shape of the antenna beam, a direction of the antenna beam and a power of the antenna beam based on the output of the proximity detector.

12. The portable terminal of claim 11, wherein the antenna controller reduces a power transmitted by the antenna beam when the proximity detector detects an object within a predetermined distance from at least one of the antenna beam and the portable terminal.

13. The portable terminal of claim 11, wherein the antenna controller outputs an alarm when the proximity detector detects the object within a predetermined distance from a path of the antenna beam.

14. The portable terminal of claim 1, further comprising:

a database; and

a Global Positioning System signal receiver that receives Global Positioning System signals, wherein the antenna controller determines an elevation angle of the satellite based on a position of the satellite and a position of the portable terminal, the position of the satellite being determined based on data in the database and the position of the portable terminal being determined based on the Global Positioning System signals, the antenna controller forming a fan beam at the determined elevation angle, the fan beam being directed at the satellite if the portable terminal is maintained at a preset attitude and a bearing generally facing the satellite.

15. The portable terminal of claim 14, wherein the preset attitude is vertical.

16. The portable terminal of claim 1, wherein the satellite is one of a geostationary earth orbit satellite, a medium altitude earth orbit satellite, a low altitude earth orbit satellite, an intermediate circular orbit satellite and a geo-helio synchronous orbit satellite.

17. The portable terminal of claim 1, wherein the directional antenna is a phased array antenna.

18. The portable terminal of claim 17, wherein the phased array antenna is one of a planar phased array antenna and a volumetric phased array antenna.

19. A method for operating a portable terminal, comprising:

forming an antenna beam of a directional antenna; and

determining a direction of the antenna beam based on information generated by a portable terminal to allow the portable terminal to communicate with a satellite.

20. The method of claim 19, further comprising directing the antenna beam in the direction generated by the determining step.

21. The method of claim 19, further comprising generating steering information that includes a position, a bearing and an attitude of the portable terminal.

22. The method of claim 21, wherein the steering information is generated based on data received from a Global Positioning System signal receiver that receives Global Positioning System signals and steering information sensors that include at least one of a compass, a gyroscope, a plumb line and an attitude sensor.

23. The method of claim 21, further comprising maintaining the antenna beam of the directional antenna toward the satellite based on a position of the satellite and the steering information generated by the portable terminal.

24. The method of claim 23, further comprising determining the position of the satellite based on at least one of data retrieved from a database and position data received from the satellite.

25. The method of claim 24, further comprising generating orbital information based on the retrieved data and a clock, the determining the position of the satellite step determining the position of the satellite based on the orbital information.

26. The method of claim 23, further comprising one of snapping and bridging the antenna beam to transition from communicating with the satellite to communicating with another satellite.

27. The method of claim 26, wherein snapping the antenna beam comprises determining a time to snap the

antenna beam from the satellite to the another satellite, the time being determined by one of the antenna controller and receiving a synchronization signal received from the satellite.

28. The method of claim 26, wherein bridging the antenna beam comprises:

broadening the antenna beam to communicate with the satellite and the another satellite simultaneously; and

reforming the broadened antenna beam to direct the antenna beam toward the another satellite at a time determined by at least one of the antenna controller , the satellite and the another satellite.

29. The method of claim 19, further comprising:

generating proximity information of an object; and

adjusting the antenna beam based on the proximity information output by the generating step.

30. The method of claim 29, wherein the adjusting step comprises one of reshaping the antenna beam, changing the direction of the antenna beam and reducing a power of the antenna beam.

31. The method of claim 30, wherein reducing the power step is performed when an object is within a predetermined distance from at least one of the antenna beam and the portable terminal.

32. The method of claim 29, further comprising outputting an alarm when the object is within a predetermined distance from a path of the antenna beam.

33. The method of claim 19, further comprising:

determining an elevation angle of the satellite; and

forming a fan beam at the elevation angle, wherein the elevation angle is determined based on a position of the satellite and a position of the portable terminal, the position of the satellite being determined

based on data in a database of the portable terminal and the position of the portable terminal being determined based on Global Positioning System signals, the fan beam being directed at the satellite if the portable terminal is maintained at a preset attitude.

34. The method of claim 33, wherein the preset attitude is vertical.

35. The method of claim 19, wherein the satellite is one of a geostationary earth orbit satellite, a medium altitude earth orbit satellite, a low altitude earth orbit satellite, an intermediate circular orbit satellite and a geo-helio synchronous orbit satellite.

36. The portable terminal of claim 19, wherein the directional antenna is a phased array antenna.

37. The portable terminal of claim 36, wherein the phased array antenna is one of a planar phased array antenna and a volumetric phased array antenna.

FIG. 1

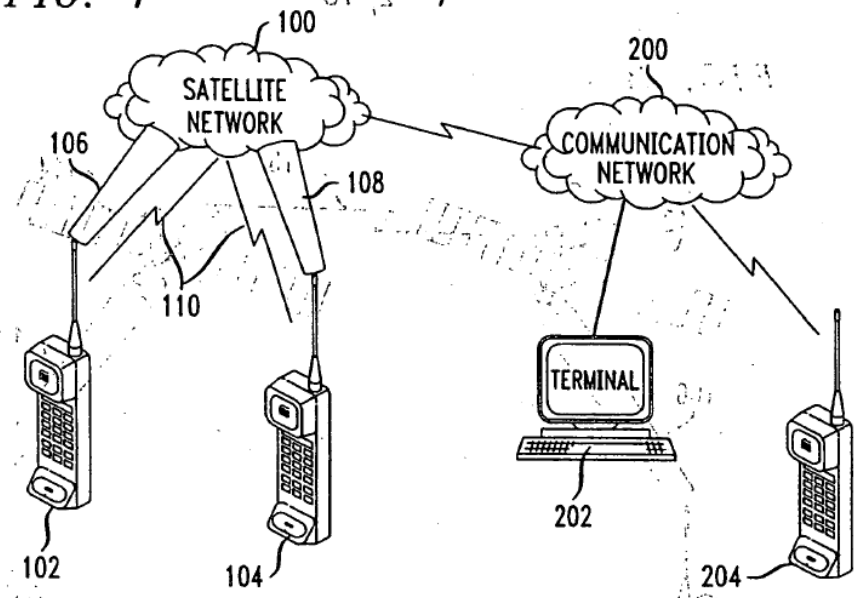

100
SATELLITE NETWORK
200
COMMUNICATION NETWORK
106
108
110
TERMINAL
102
104
202
204

FIG. 2

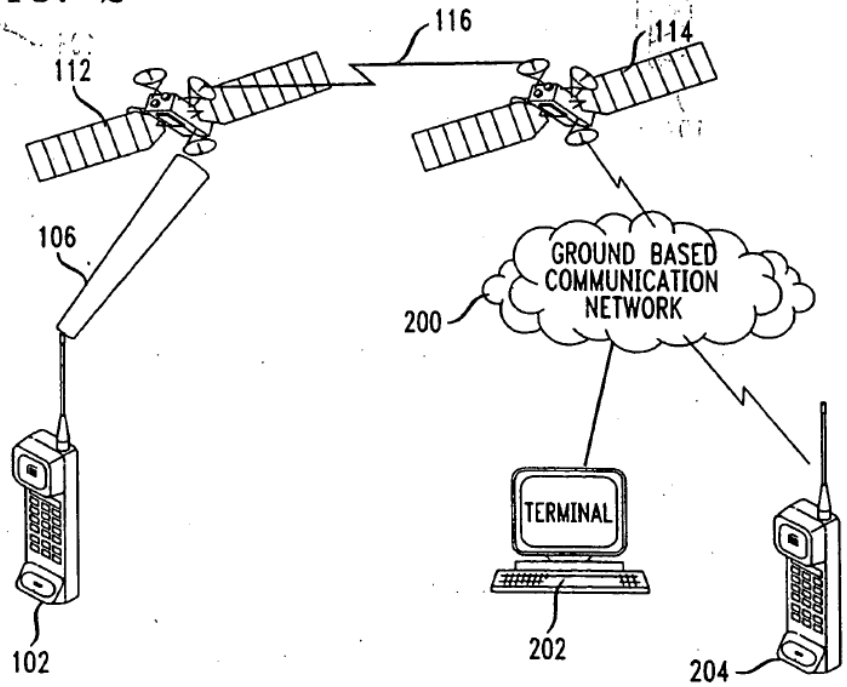

116
114
112
106
GROUND BASED COMMUNICATION NETWORK
200
TERMINAL
102
202
204

FIG. 3

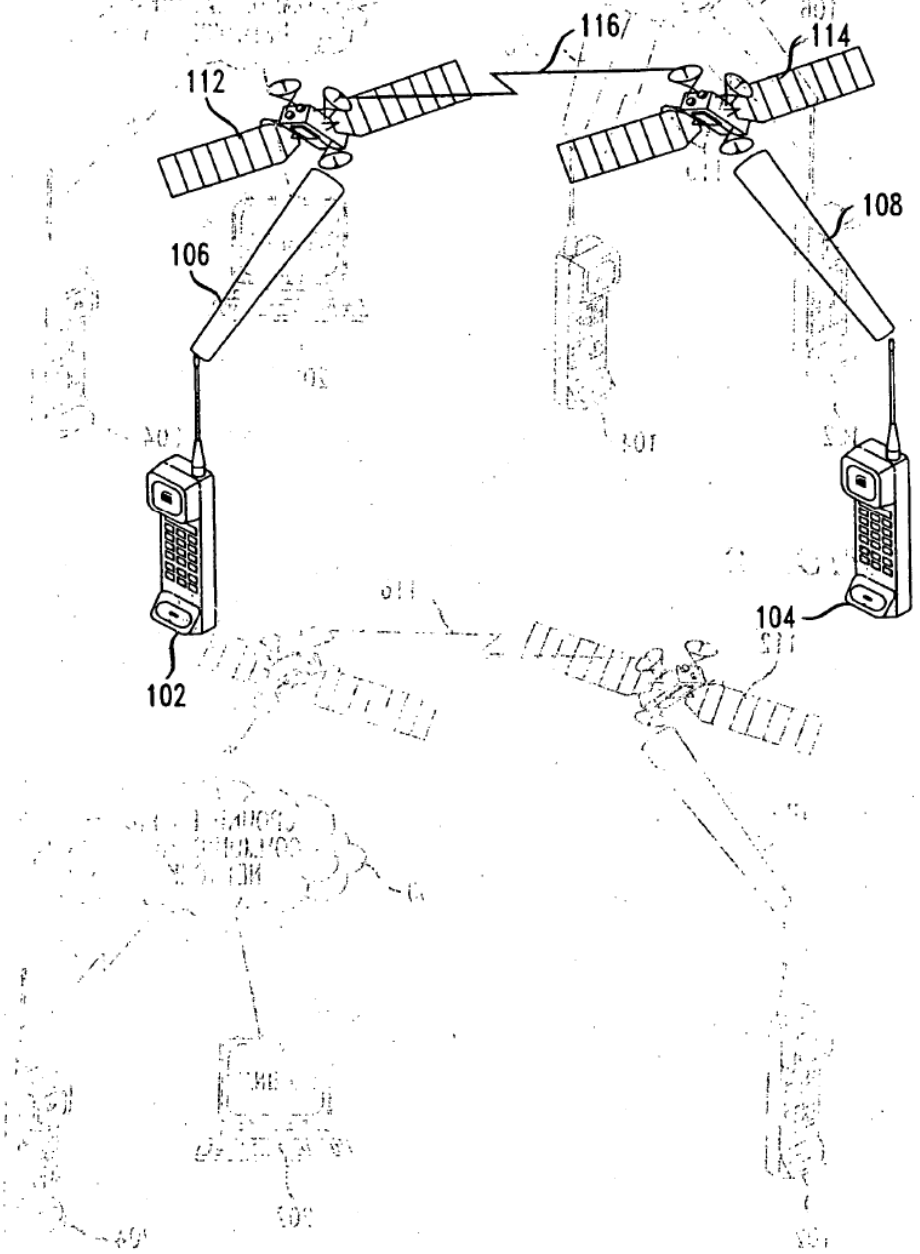


FIG. 4A

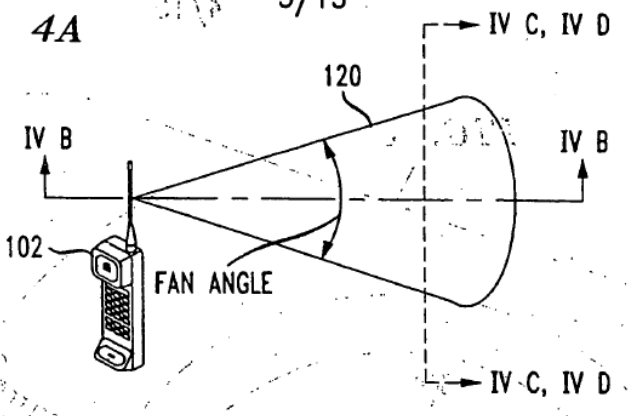


FIG. 4B

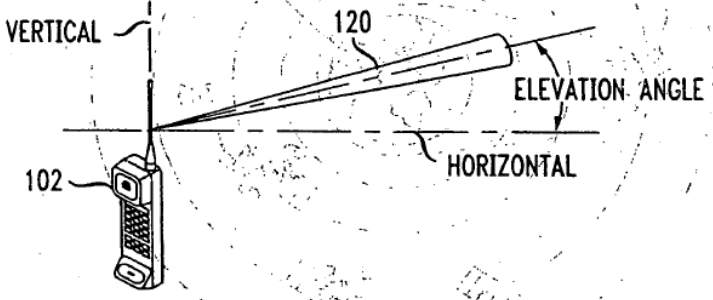


FIG. 4C

FIG. 4D

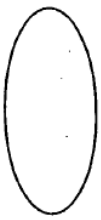


FIG. 5

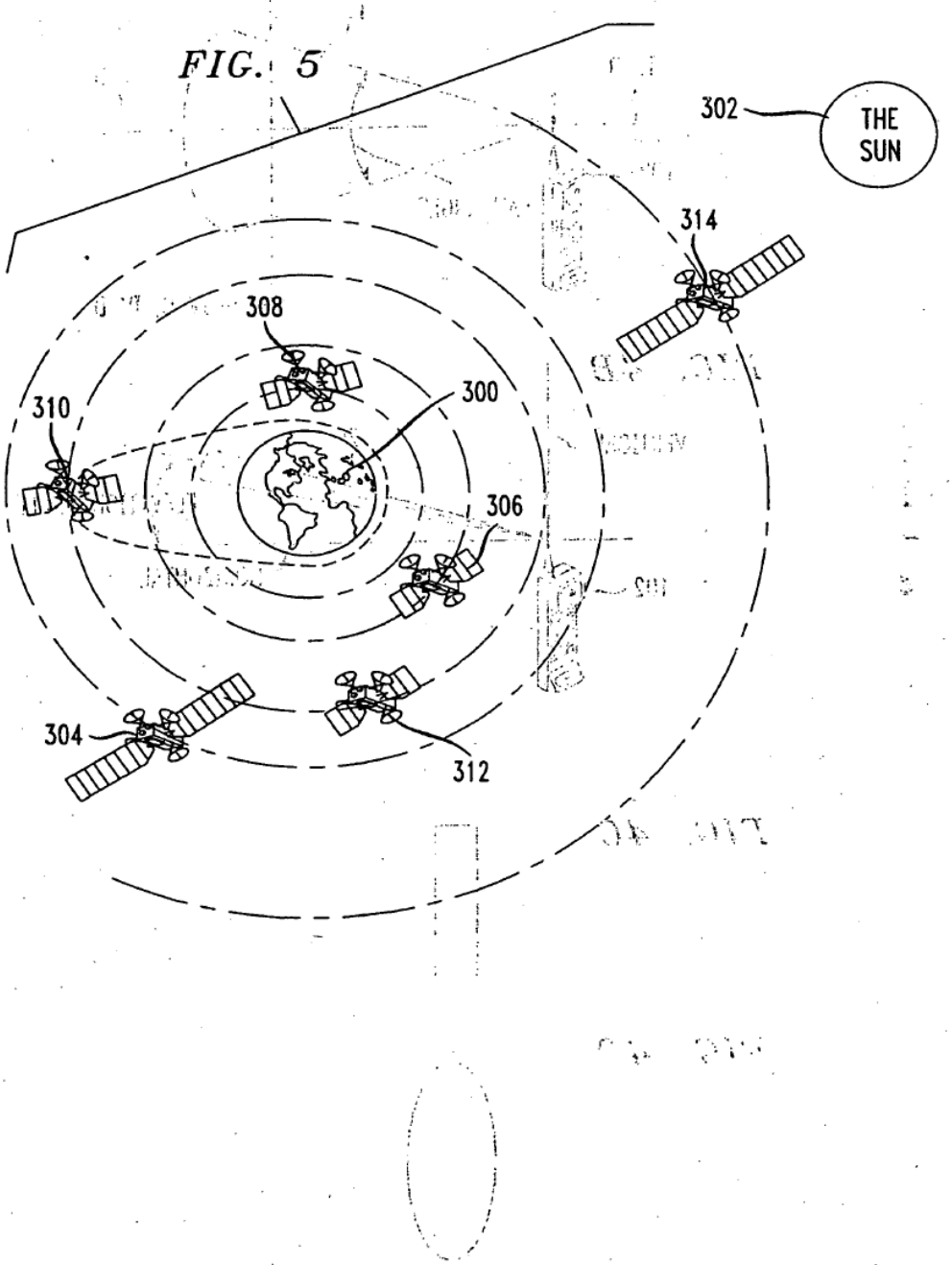


FIG. 6

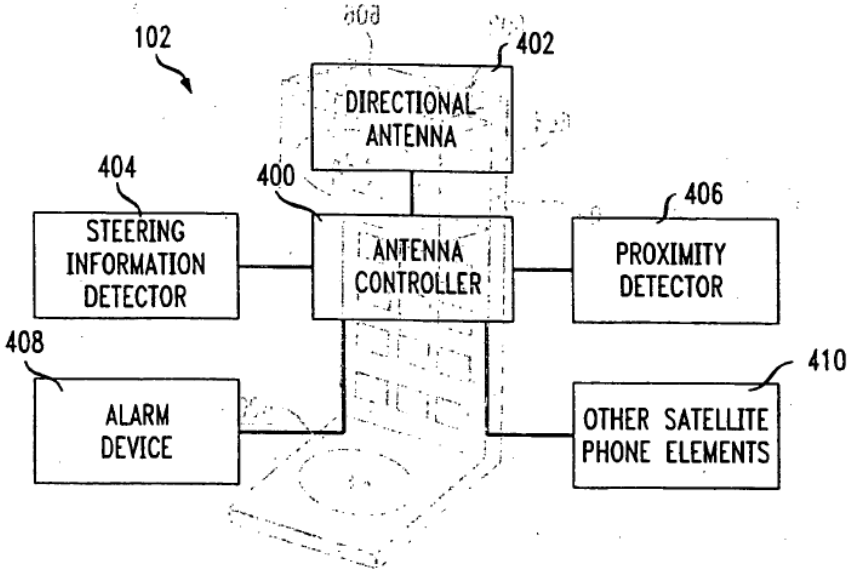

102
402
DIRECTIONAL ANTENNA
404
400
406
STEERING INFORMATION DETECTOR
ANTENNA CONTROLLER
PROXIMITY DETECTOR
408
410
ALARM DEVICE
OTHER SATELLITE PHONE ELEMENTS

FIG. 7

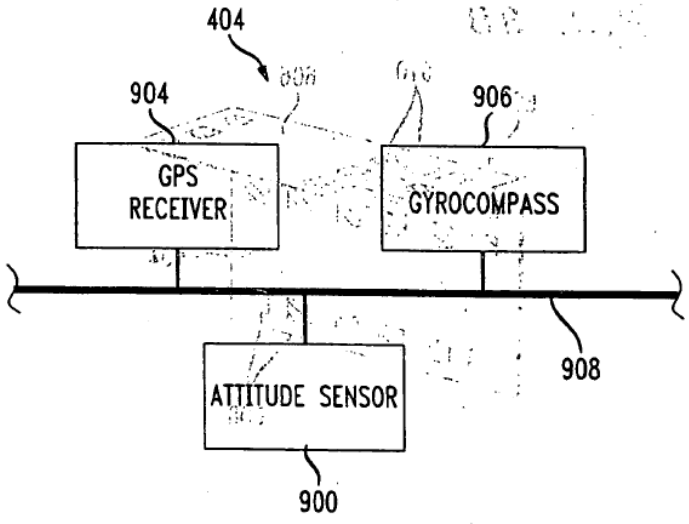

404
904
906
GPS RECEIVER
GYROCOMPASS
908
ATTITUDE SENSOR
900

FIG. 8A

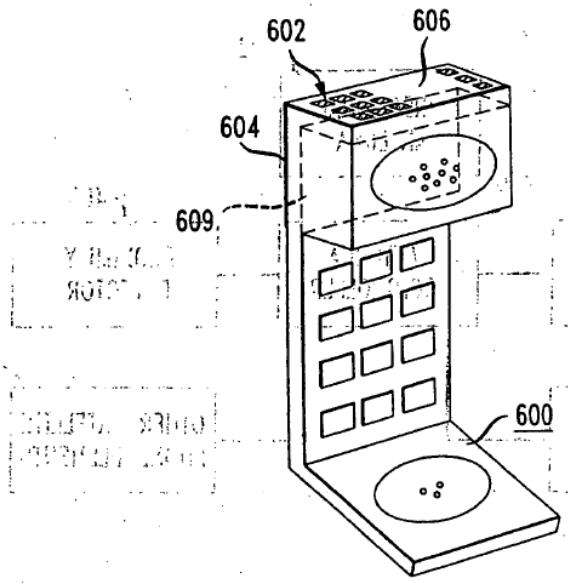


FIG. 8B

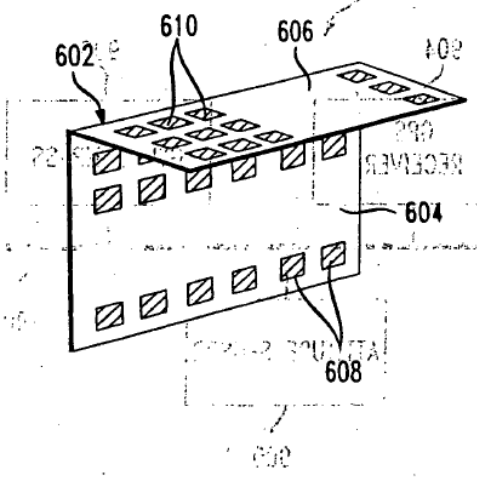


FIG. 8C

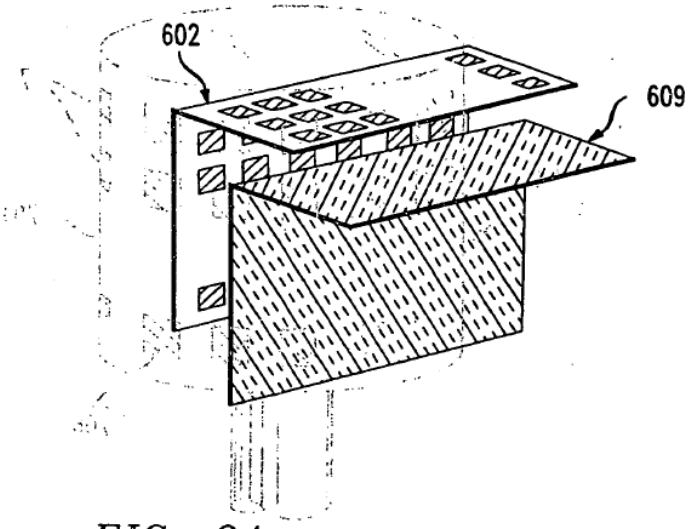


FIG. 9A

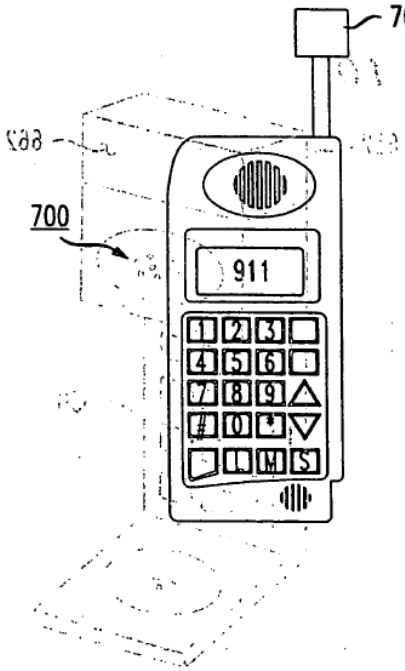


FIG. 9B

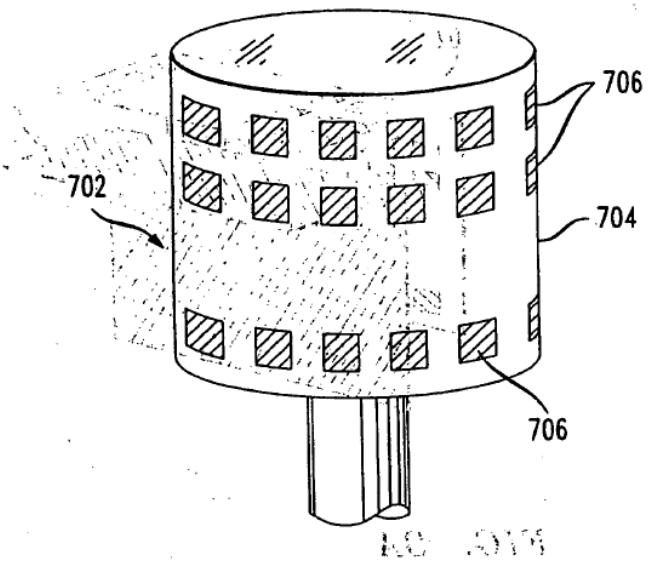


FIG. 10

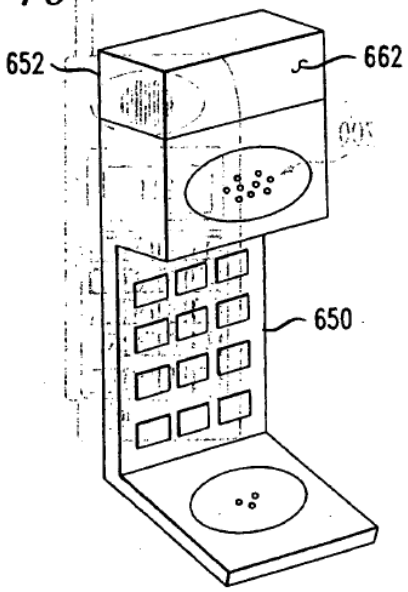


FIG. 11

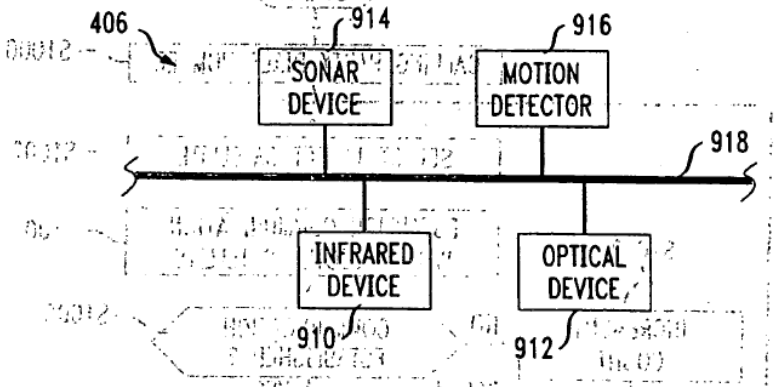


FIG. 12

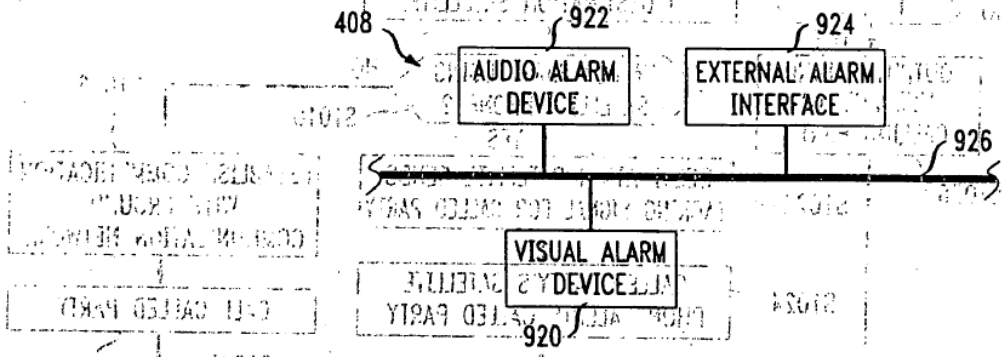


FIG. 13

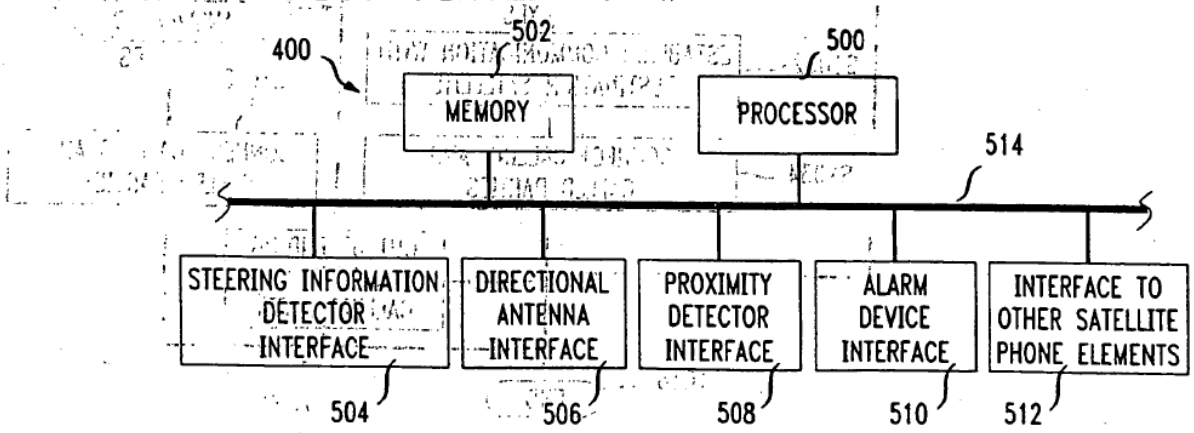


FIG. 14

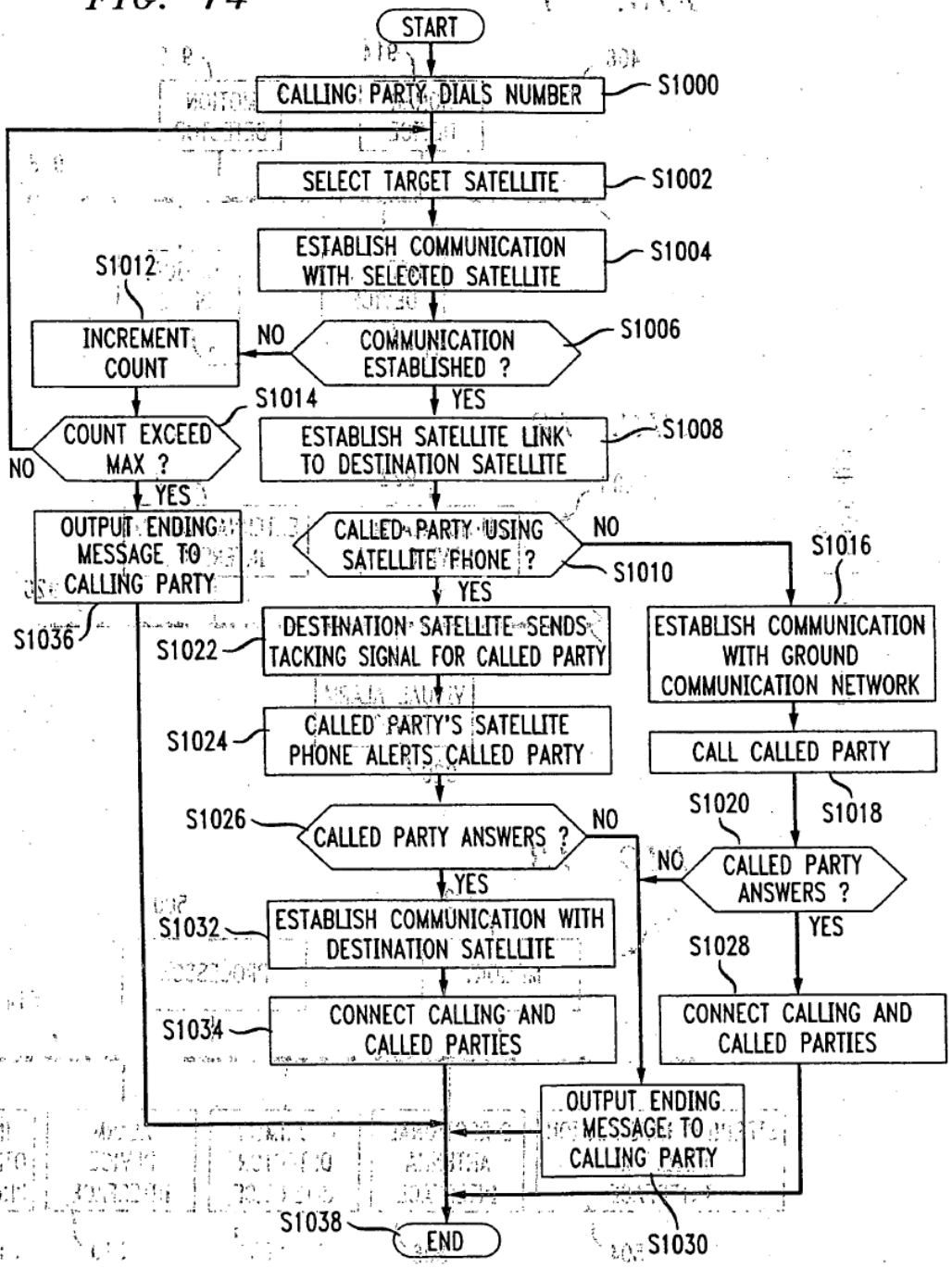

START
CALLING PARTY DIALS NUMBER
S1000
SELECT TARGET SATELLITE
S1002
ESTABLISH COMMUNICATION WITH SELECTED SATELLITE
S1004
S1012
INCREMENT COUNT
NO
COMMUNICATION ESTABLISHED ?
S1006
YES
S1014
COUNT EXCEED MAX ?
NO
YES
ESTABLISH SATELLITE LINK TO DESTINATION SATELLITE
S1008
OUTPUT ENDING MESSAGE TO CALLING PARTY
S1036
CALLED PARTY USING SATELLITE PHONE ?
NO
S1010
S1016
YES
DESTINATION SATELLITE SENDS TACKING SIGNAL FOR CALLED PARTY
S1022
ESTABLISH COMMUNICATION WITH GROUND COMMUNICATION NETWORK
CALLED PARTY'S SATELLITE PHONE ALERTS CALLED PARTY
S1024
CALL CALLED PARTY
S1020
S1018
S1026
CALLED PARTY ANSWERS ?
NO
NO
CALLED PARTY ANSWERS ?
YES
S1032
ESTABLISH COMMUNICATION WITH DESTINATION SATELLITE
YES
S1028
S1034
CONNECT CALLING AND CALLED PARTIES
CONNECT CALLING AND CALLED PARTIES
OUTPUT ENDING MESSAGE TO CALLING PARTY
S1038
END
S1030

FIG. 15

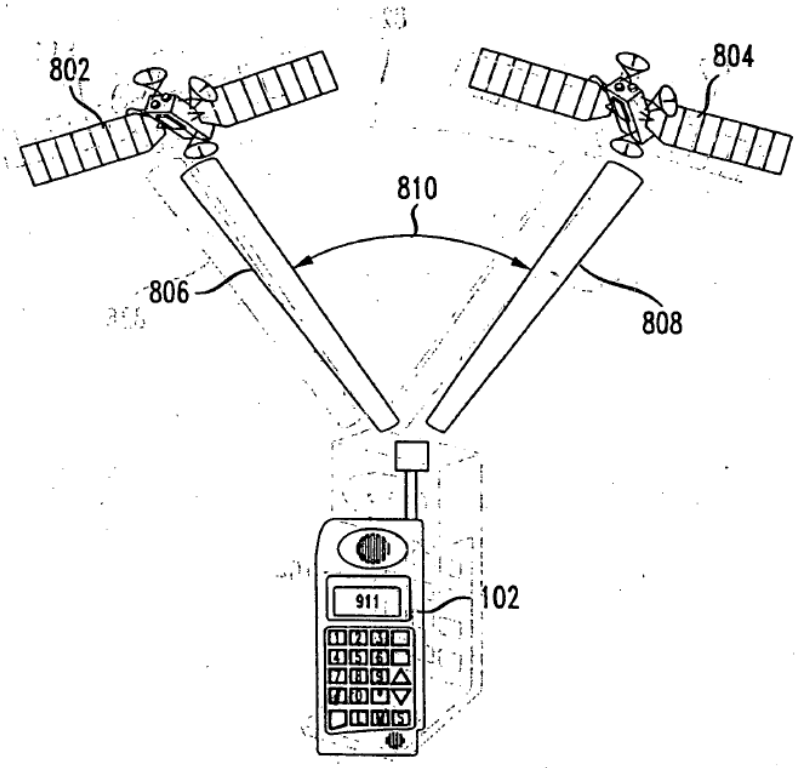


FIG. 16

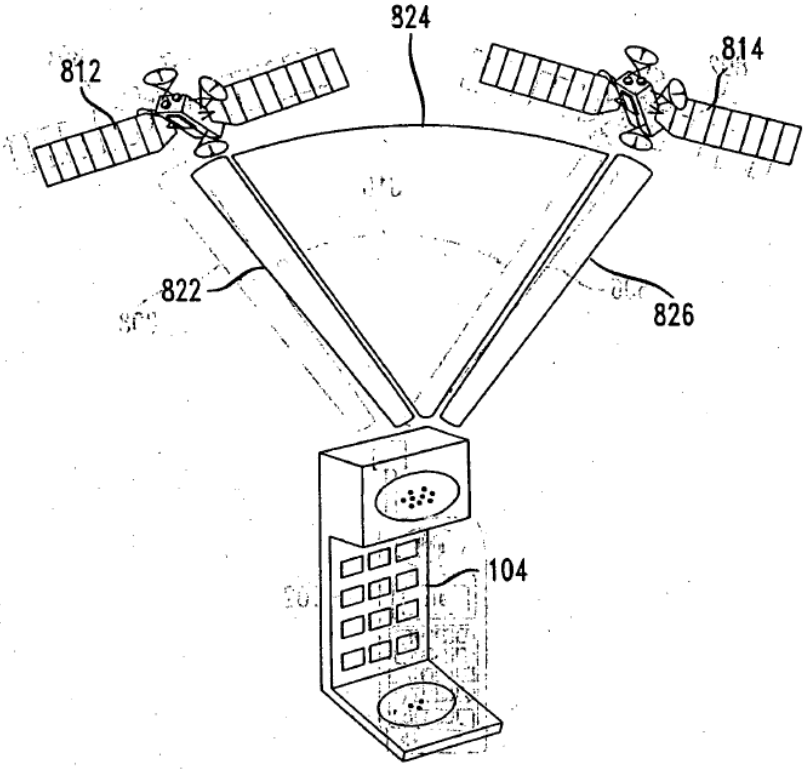


FIG. 17 13/15

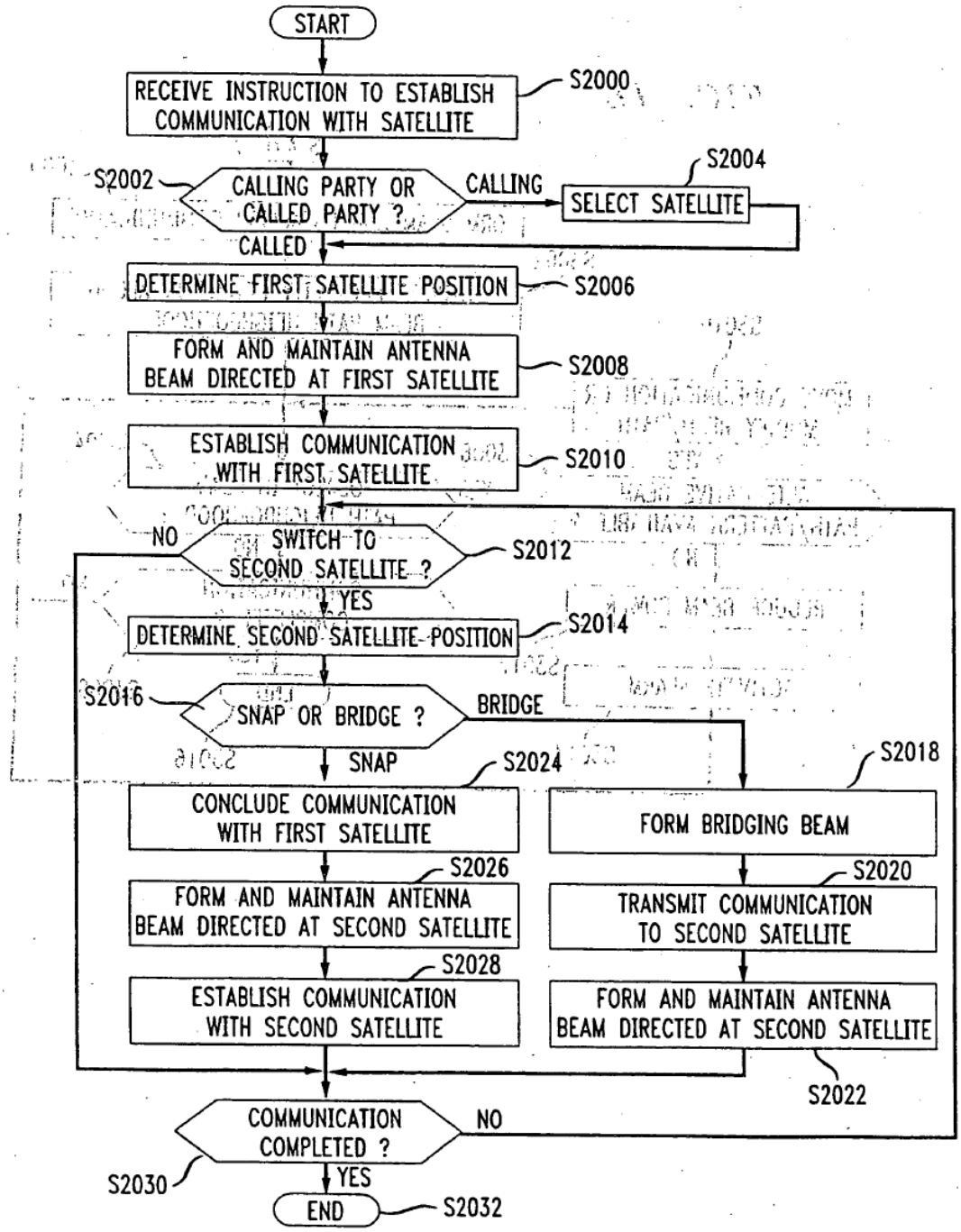
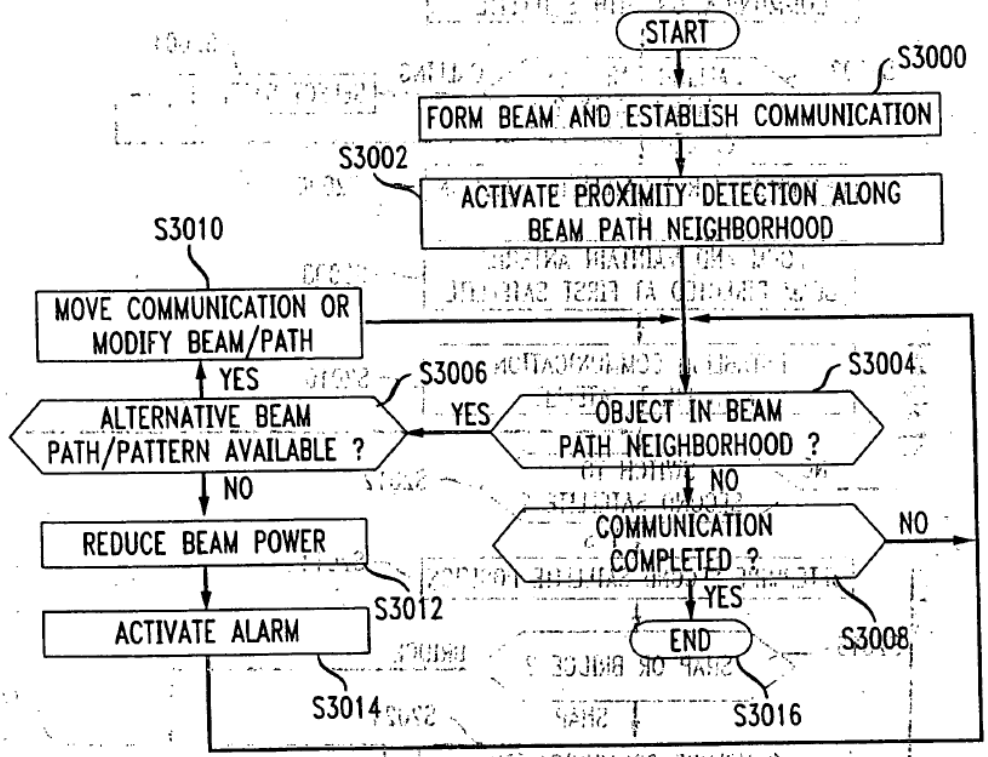

START
RECEIVE INSTRUCTION TO ESTABLISH COMMUNICATION WITH SATELLITE
S2000
S2002
CALLING PARTY OR CALLED PARTY ?
CALLING
S2004
SELECT SATELLITE
CALLED
DETERMINE FIRST SATELLITE POSITION
S2006
FORM AND MAINTAIN ANTENNA BEAM DIRECTED AT FIRST SATELLITE
S2008
ESTABLISH COMMUNICATION WITH FIRST SATELLITE
S2010
NO
SWITCH TO SECOND SATELLITE ?
S2012
YES
DETERMINE SECOND SATELLITE POSITION
S2014
S2016
SNAP OR BRIDGE ?
BRIDGE
SNAP
S2024
CONCLUDE COMMUNICATION WITH FIRST SATELLITE
S2026
FORM AND MAINTAIN ANTENNA BEAM DIRECTED AT SECOND SATELLITE
S2028
ESTABLISH COMMUNICATION WITH SECOND SATELLITE
S2018
FORM BRIDGING BEAM
S2020
TRANSMIT COMMUNICATION TO SECOND SATELLITE
FORM AND MAINTAIN ANTENNA BEAM DIRECTED AT SECOND SATELLITE
S2022
COMMUNICATION COMPLETED ?
NO
S2030
YES
END
S2032

FIG. 18


START
S3000
FORM BEAM AND ESTABLISH COMMUNICATION
S3002
ACTIVATE PROXIMITY DETECTION ALONG BEAM PATH NEIGHBORHOOD
S3010
MOVE COMMUNICATION OR MODIFY BEAM/PATH
YES
S3006
ALTERNATIVE BEAM PATH/PATTERN AVAILABLE ?
YES
S3004
OBJECT IN BEAM PATH NEIGHBORHOOD ?
NO
NO
REDUCE BEAM POWER
COMMUNICATION COMPLETED ?
NO
S3012
YES
ACTIVATE ALARM
END
S3008
S3014
S3016

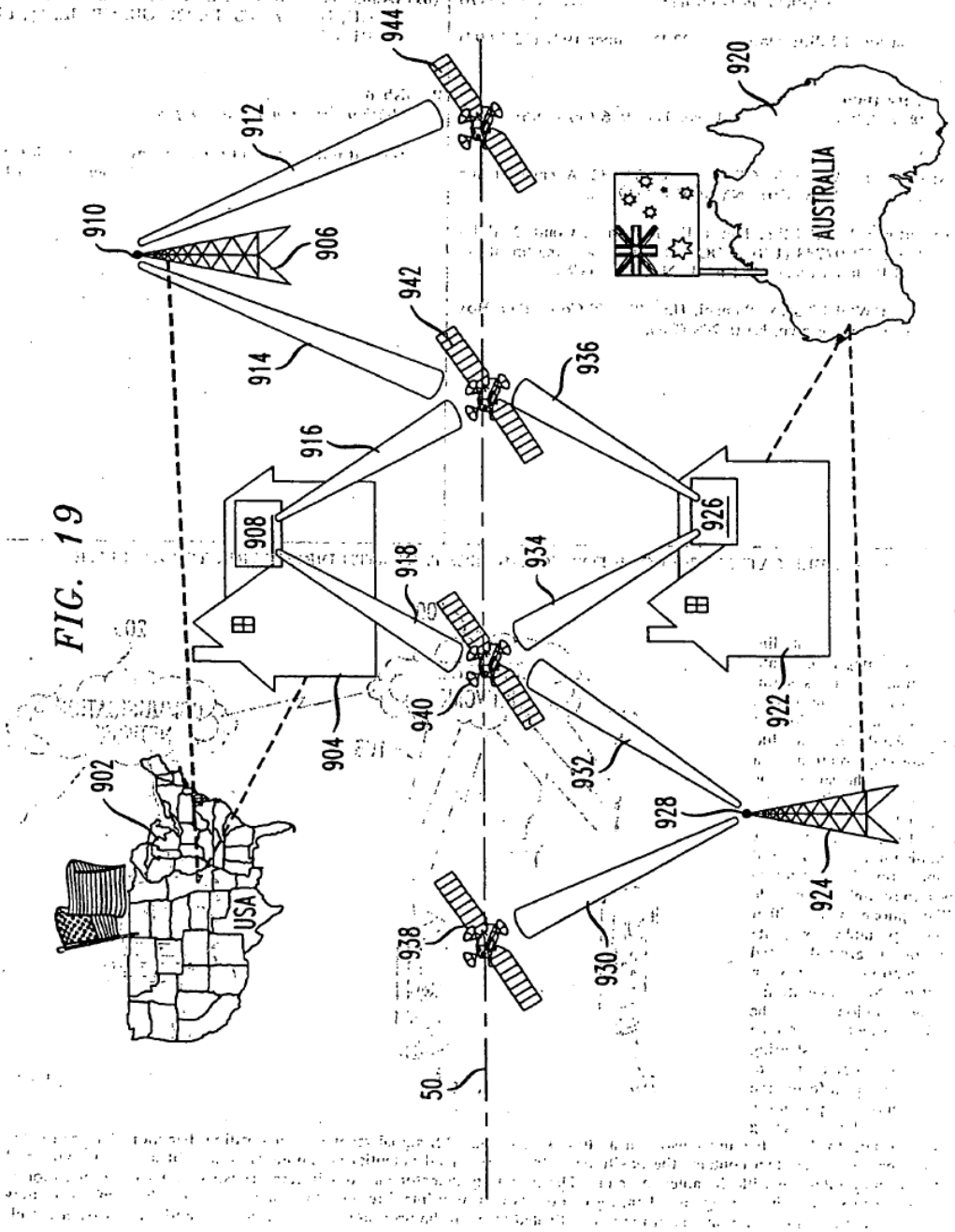

944
912
910
906
914
942
936
916
908
918
934
926
940
904
902
USA
922
932
928
924
938
930
50
920
AUSTRALIA

FIG. 19

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INTERNATIONAL APPLICATION PUBLISHED UNDER THE PATENT COOPERATION TREATY (PCT)

(51) International Patent Classification 6 : **H04B 7/185, 7/26**

A3

(11) International Publication Number: **WO 98/29968**

(43) International Publication Date: 9 July 1998 (09.07.98)

(21) International Application Number: PCT/US97/24170

(22) International Filing Date: 23 December 1997 (23.12.97)

(30) Priority Data:
08/774,456 30 December 1996 (30.12.96) US

(71) Applicant: AT & T CORP. [US/US]; 32 Avenue of the Americas, New York, NY 10013-2412 (US).

(72) Inventors: BRADLEY, James, F.; 17 Shawn Court, Middletown, NJ 07748 (US). COOPER, Paul, W.; Apartment #4, 138 Bodman Place, Red Bank, NJ 07701 (US).

(74) Agent: DWORETSKY, Samuel, H.; AT & T Corp., P.O. Box 4110, Middletown, NJ 07748 (US).

(81) Designated States: CA, JP, MX, European patent (AT, BE, CH, DE, DK, ES, FI, FR, GB, GR, IE, IT, LU, MC, NL, PT, SE).

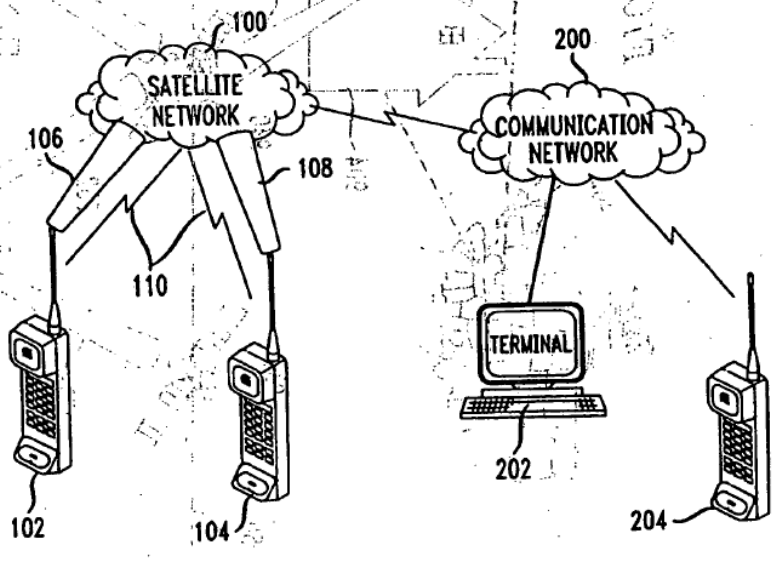
Published
With international search report.

(88) Date of publication of the international search report:
11 September 1998 (11.09.98)

(54) Title: PORTABLE SATELLITE PHONE FOR COMMUNICATION WITH DIRECT LINK TO SATELLITE

(57) Abstract

A portable satellite phone is integrated into a communication system. The portable satellite phone forms a highly directed beam toward a satellite and adaptively maintains a beam to track the satellite as the portable satellite phone and/or the satellite moves relative to each other. A communication system based on the portable satellite phones may link a portable satellite phone with either another portable satellite phone or a ground based communication system connected to conventional telephone stations. The portable satellite phone includes a steering information detector or both a steering information detector and a proximity detector. The steering information detector has a bearing sensor, an attitude sensor and GPS signal receivers for position detection. The portable satellite phone also includes a database that contains the positional information of all potential communication satellites. The proximity detector detects objects that may interfere with the antenna beam. The proximity detector includes infrared sensors, sonar detectors, motion detectors and optical devices to determine a range and bearing of objects that may interfere with the antenna beam. When an object may be harmed or interfere with the antenna beam, an alarm may be activated to warn the user and/or the object of potential harm from the electro-magnetic energy transmitted by the directed antenna.



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INTERNATIONAL SEARCH REPORT

Inter - onal Application No
PCT/US 97/24170

A. CLASSIFICATION OF SUBJECT MATTER
IPC 6 H04B7/185 H04B7/26

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)
IPC 6 H04B H01Q

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	EP 0 600 699 A (ALL NIPPON AIRWAYS CO LTD ;JAPAN BROADCASTING CORP (JP)) 8 June 1994 see abstract see column 1, line 20 - column 2, line 29 see column 3, line 25-38 see column 3, line 51-58 see column 4, line 14-24 see column 4, line 42-52 see column 5, line 41 - column 6, line 3 see column 6, line 10 - column 7, line 4 see figures 1,12 see claims 1,4,6	1-3,5,6, 11,12, 16-21, 23,24, 29-31, 35-37

[X] Further documents are listed in the continuation of box C.

[X] Patent family members are listed in annex.

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"P" document published prior to the international filing date but later than the priority date claimed

"T" later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention

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"&" document member of the same patent family

Date of the actual completion of the international search	Date of mailing of the international search report
18 June 1998	24/06/1998

Name and mailing address of the ISA	Authorized officer
European Patent Office, P.B. 5818 Patentlaan 2 NL - 2280 HV Rijswijk Tel. (+31-70) 340-2040, Tx. 31 651 epo nl. Fax: (+31-70) 340-3016	Dejonghe, O

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INTERNATIONAL SEARCH REPORT

International Application No
PCT/US 97/24170

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
Y	US 5 581 268 A (HIRSHFIELD EDWARD) 3 December 1996 see column 1, line 12-30 see column 5, line 66 - column 6, line 26 see figures 2A,4 see claims 9,14-16,19 ---	1-3,5,6,16-21,23,24,35-37
Y	US 5 541 609 A (STUTZMAN WARREN L ET AL) 30 July 1996 see abstract see column 1, line 10-15 see column 2, line 22-28 see column 2, line 38-52 see column 3, line 13-28 see column 3, line 48-61 see column 4, line 21-51 see figures 2,5 see claims 1,4,6,8,9,12,14 ---	11,12,29-31
A	EP 0 578 316 A (PRODUCTION ET DE CREATION AUDI) 12 January 1994 see abstract see column 1, line 1-10 see column 1, line 33-53 see column 2, line 19-26 see column 2, line 56 - column 3, line 51 see column 7, line 35 - column 9, line 25 see column 9, line 34-49 see column 10, line 5-10 see figures see claims 1,5,6,8 ---	1-7,19-25
A	US 5 440 290 A (MCCULLOUGH CHARLES E ET AL) 8 August 1995 see abstract see column 1, line 8-57 see column 3, line 8-26 see column 3, line 40-50 see column 4, line 2-17 see column 4, line 39-48 see column 5, line 22-35 see column 5, line 44-46 see figure 2 see claims 1,2,4,11,16,17 ---	11-13,29-32
A	US 5 559 806 A (KURBY CHRISTOPHER N ET AL) 24 September 1996 see abstract see column 6, line 56 - column 7, line 49 see column 8, line 1-9 see figure 1 see claims 1,5-7,9,12 --- -/--	8-10,26-28

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INTERNATIONAL SEARCH REPORT

Inte. onal Application No
PCT/US 97/24170

C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category	Citation of document, with indication where appropriate, of the relevant passages	Relevant to claim No.
A	US 5 347 286 A (BABITCH DANIEL) 13 September 1994 see abstract see column 1, line 11-16 see column 1, line 27-64 see column 10, line 13-42 see column 11, line 10-30 see column 16, line 33-46 see column 17, line 3-16 see column 17, line 66 - column 18, line 45 see column 19, line 33-53 see column 20, line 13-21 see claims	14,15, 33,34

Form PCT/ISA/210 (continuation of second sheet) (July 1992)

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No
PCT/US 97/24170

Patent document cited in search report	Publication date	Patent family member(s)	Publication date
EP 0600699 A	08-06-1994	JP 6169212 A	14-06-1994
		JP 6169274 A	14-06-1994
		CA 2110205 A	31-05-1994
		US 5678171 A	14-10-1997
US 5581268 A	03-12-1996	AU 4749896 A	05-03-1997
		CA 2167427 A	04-02-1997
		CN 1142695 A	12-02-1997
		EP 0757406 A	05-02-1997
		FI 960283 A	04-02-1997
		JP 9051227 A	18-02-1997
		WO 9706577 A	20-02-1997
US 5541609 A	30-07-1996	WO 9627915 A	12-09-1996
EP 0578316 A	12-01-1994	FR 2693329 A	07-01-1994
US 5440290 A	08-08-1995	NONE	
US 5559806 A	24-09-1996	NONE	
US 5347286 A	13-09-1994	NONE	

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$ SECTOR

DOCKET NO. R.L. MCDOWELL 20-76 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Richard L. McDowell, et al.

Serial No.: 09/967,140

Filed: September 28, 2001

For: A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

Group: 2681

Examiner: N/A

Commissioner for Patents
Washington, D. C. 20231

Attn: Application Processing Division, Special Processing and Correspondence Branch

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Stephanie Pratt
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Stephanie Pratt
(Signature of the person signing the certificate)

Sir:

RESPONSE TO MISSING PARTS OF APPLICATION

In response to the Notice to File Missing Parts of Application dated October 29, 2001, attached are the following documents:

1. Declaration and Power of Attorney;
2. Assignment;
3. Assignment Transmittal;
4. A copy of the Notice to File Missing Parts of Application; and

UNITED STATES PATENT AND TRADEMARK OFFICE

COMMISSIONER FOR PATENTS
UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
www.uspto.gov

APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/967,140	09/28/2001	Richard L. McDowell	R.L. MCDOWELL 20-76

CONFIRMATION NO. 4925

27964
HITT GAINES & BOISBRUN P.C.
P.O. BOX 832570
RICHARDSON, TX 75083

FORMALITIES LETTER

OC000000006983662

Date Mailed: 10/29/2001

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(l) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 130.**

A copy of this notice MUST be returned with the reply.

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Initial Patent Examination Division (703) 308-1202
PART 2 - COPY TO BE RETURNED WITH RESPONSE

01/24/2002 ANABI1 00000056 501735 09967140
01 FC:105 130.00 CH

5. Our postcard receipt.

The Commissioner is hereby authorized to charge the surcharge of $130.00 and any additional fees connected with this communication or credit any overpayment to Deposit Account No. 501735.

Respectfully submitted,

HITT GAINES & BOISBRUN, P.C.

Glenn W. Boisbrun
Registration No. 39,615

Date: 11/15/01

P.O. Box 832570
Richardson, Texas 75083
(972) 480-8800

ATTORNEY DOCKET NO.: R.L. MCDOWELL 20-76 **PATENT** #3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

COPY OF PAPERS ORIGINALLY FILED

Declaration and Power of Attorney

As a below named inventor, I hereby declare that:

My residence, post office address and citizenship are as stated below next to my name.

I believe I am an original, first and joint inventor of the subject matter which is claimed and for which a patent is sought on the invention entitled "A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF," the specification of which is attached hereto.

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment, if any, specifically referred to in this oath or declaration.

I acknowledge the duty to disclose to all information known to me which is material to the patentability as defined in Title 37, Code of Federal Regulations, § 1.56.

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate listed below and have also identified below any foreign application for patent or inventor's certificate having a filing date before that of the application on which priority is claimed:

NUMBER	COUNTRY	DATE FILED	PRIORITY CLAIMED
	None		

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in the prior United States application in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose all information known to me to be material to patentability as defined in Title 37, Code of Federal Regulations, § 1.56 which became available between the filing date of the prior application and the national or PCT international filing date of this application.

US/PCT Serial Num	Date Filed	Status
None		

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

I hereby appoint the following attorney(s) with full power of substitution and revocation, to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected therewith:

Lester H. Birnbaum	(Reg. No. 25,830)
Richard J. Botos	(Reg. No. 32,016)
Gerard A. deBlasi	(Reg. No. 34,149)
Anthony Grillo	(Reg. No. 36,535)
Mark A. Kurisko	(Reg. No. 38,944)
Robert P. Marley	(Reg. No. 32,914)
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Geraldine Monteleone	(Reg. No. 40,097)
Scott J. Rittman	(Reg. No. 39,010)
Ferdinand M. Romano	(Reg. No. 32,752)
David L. Smith	(Reg. No. 30,592)
John P. Veschi	(Reg. No. 39,058)

I hereby appoint the attorney(s) on ATTACHMENT A as associate attorney(s) in the aforementioned application, with full power solely to prosecute said application, to make alterations and amendments therein, to receive the patent, and to transact all business in the Patent and Trademark Office connected with the prosecution of said application. No other powers are granted to such associate attorney(s) and such associate attorney(s) are specifically denied any power of substitution or revocation.

Full name of first inventor: Richard L. McDowell

Inventor's signature: Richard L McDowell Date: 11/6/2021

Residence: City of Chalfont
County of Bucks
State of Pennsylvania

Citizenship: United States of America

Post Office Address: 53 East Hillcrest Avenue
Chalfont, Pennsylvania 18914

Full name of second inventor: Philip D. Mooney

Inventor's signature: _____ Date: 11/6/01

Residence: City of Sellersville
County of Bucks
State of Pennsylvania

Citizenship: United States of America

Post Office Address: 214 Crest Drive
Sellersville, Pennsylvania 18960

ATTACHMENT A

Attorney Name(s):

David H. Hitt	Registration No. 33,182
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Glenn W. Boisbrun	Registration No. 39,615
Mark E. Kelley	Registration No. 45,857
Greg H. Parker	Registration No. 44,995
Jimmy L. Heisz	Registration No. 38,914
J. Joel Justiss	Registration No. 48,981

Telephone calls should be made to Glenn W. Boisbrun of HITT GAINES & BOISBRUN, P.C. at:

Phone No.: (972) 480-8800
Fax No.: (972) 480-8865

All written communications are to be addressed to:

Glenn W. Boisbrun
HITT GAINES & BOISBRUN, P.C.
P.O. Box 832570
Richardson, Texas 75083

Atty. Docket No.: R.L. MCDOWELL 20-76

DOCKET NO. R.L. MCDOWELL 20-76 **PATENT**

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re application of:

Richard L. McDowell, et al.

Serial No.: 09/967,140

Filed: September 28, 2001

For: A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

Group: 2681

Examiner: N/A

Commissioner for Patents
Washington, D. C. 20231

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11/15/2001 (Date)
Stephanie Pratt
(Printed or typed name of person signing the certificate)
Stephanie Pratt
(Signature of the person signing the certificate)

Sir:

LETTER TO OFFICIAL DRAFTSMAN

Transmitted herewith are three sheets of formal drawings to be substituted for the informal drawings initially filed in the above-identified application for patent.

Respectfully submitted,

HITT GAINES & BOISBRUN, P.C.

Glenn W. Boisbrun
Registration No. 39,615

Date: 11/15/01

P.O. Box 832570
Richardson, Texas 75083
(972) 480-8800

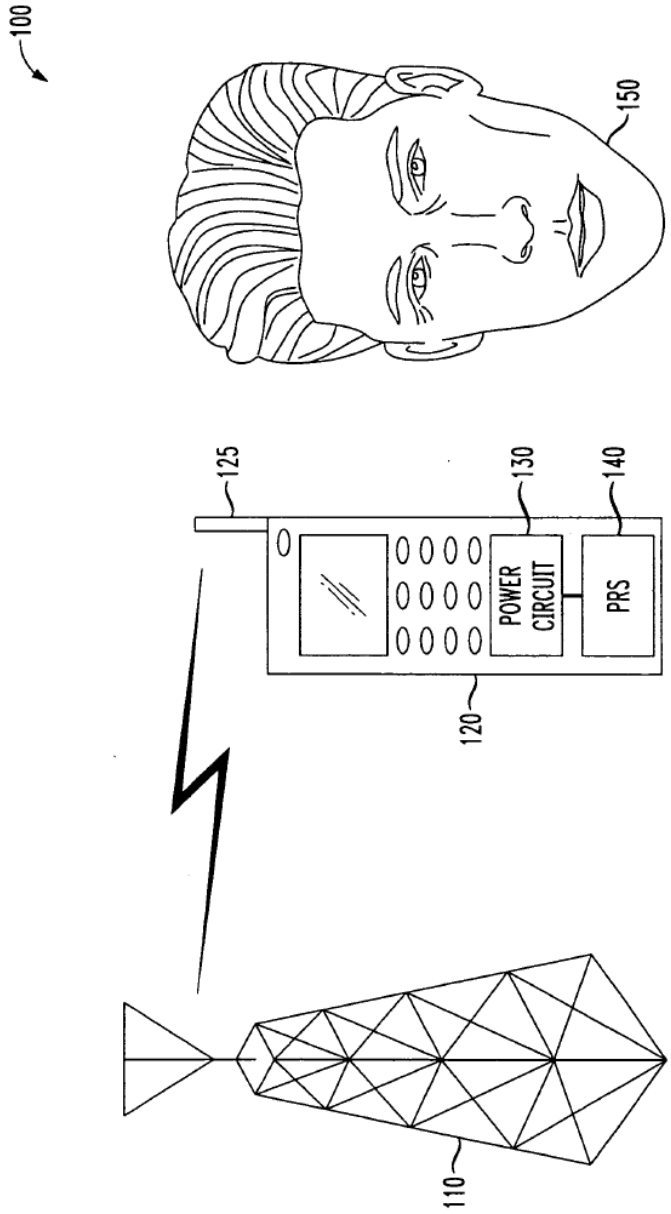


FIG. 1

FIG. 2

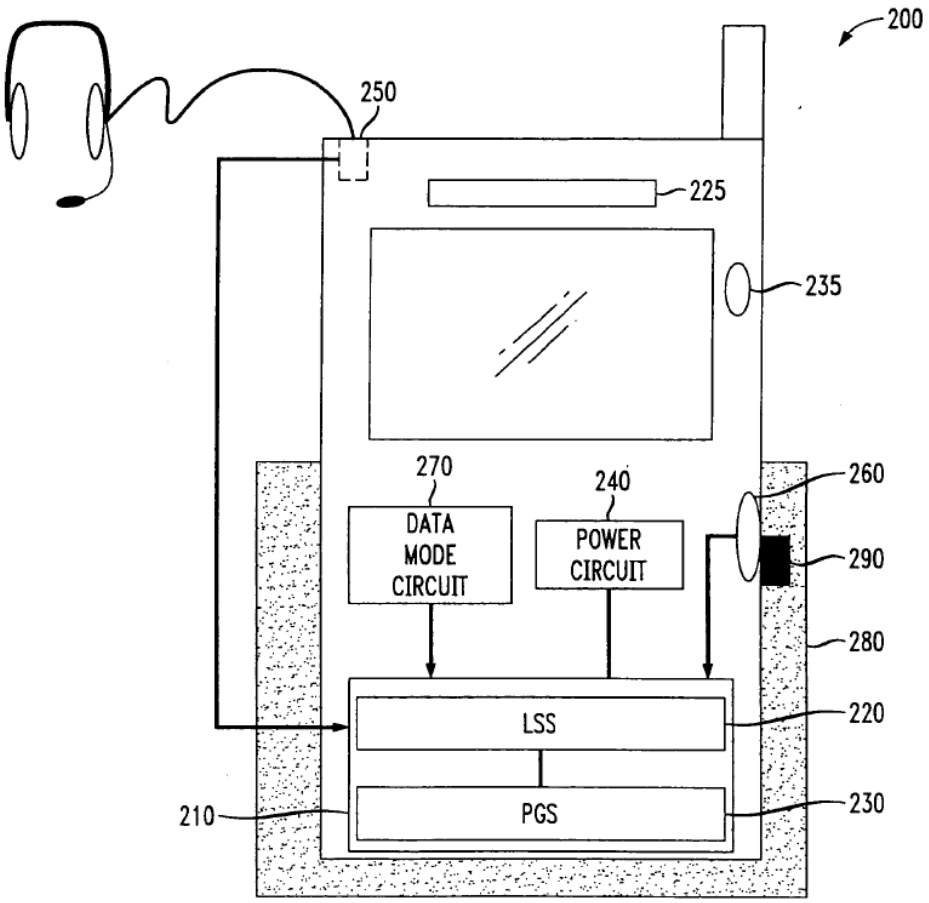
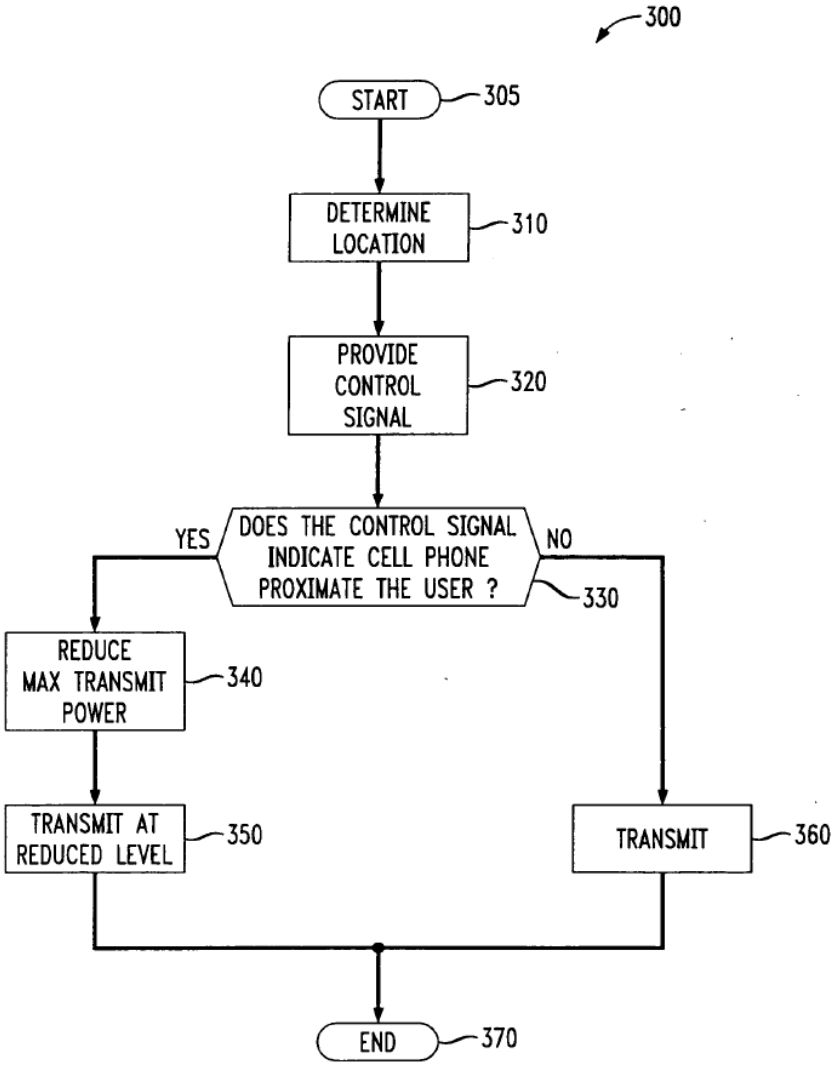

200
250
225
235
270
DATA MODE CIRCUIT
240
POWER CIRCUIT
260
290
280
LSS
220
PGS
230
210

FIG. 3


300
START
305
DETERMINE LOCATION
310
PROVIDE CONTROL SIGNAL
320
DOES THE CONTROL SIGNAL INDICATE CELL PHONE PROXIMATE THE USER ?
330
YES
NO
REDUCE MAX TRANSMIT POWER
340
TRANSMIT AT REDUCED LEVEL
350
TRANSMIT
360
END
370

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UNITED STATES PATENT AND TRADEMARK OFFICE
WASHINGTON, D.C. 20231
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APPLICATION NUMBER	FILING/RECEIPT DATE	FIRST NAMED APPLICANT	ATTORNEY DOCKET NUMBER
09/967,140	09/28/2001	Richard L. McDowell	R.L. MCDOWELL 20-76

CONFIRMATION NO. 4925

27964
HITT GAINES & BOISBRUN P.C.
P.O. BOX 832570
RICHARDSON, TX 75083

FORMALITIES LETTER

OC000000006983662

Date Mailed: 10/29/2001

NOTICE TO FILE MISSING PARTS OF NONPROVISIONAL APPLICATION

FILED UNDER 37 CFR 1.53(b)

Filing Date Granted

An application number and filing date have been accorded to this application. The item(s) indicated below, however, are missing. Applicant is given **TWO MONTHS** from the date of this Notice within which to file all required items and pay any fees required below to avoid abandonment. Extensions of time may be obtained by filing a petition accompanied by the extension fee under the provisions of 37 CFR 1.136(a).

- The oath or declaration is missing.
  A properly signed oath or declaration in compliance with 37 CFR 1.63, identifying the application by the above Application Number and Filing Date, is required.
- To avoid abandonment, a late filing fee or oath or declaration surcharge as set forth in 37 CFR 1.16(l) of $130 for a non-small entity, must be submitted with the missing items identified in this letter.
- **The balance due by applicant is $ 130.**

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09/28/01 JC997 U.S. PTO

UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	R.L. MCDOWELL 20-76
First Inventor	Richard L. McDowell
Title	A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF
Express Mail Label No.	EL843410469US

09/967140 09/28/01 JC971 U.S. PTO

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. [X] Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. [ ] Applicant claims small entity status. See 37 CFR 1.27.
3. [X] Specification [*Total Pages* 28] *(preferred arrangement set forth below)*
   - Descriptive title of the invention
   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings (*if filed*)
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [X] Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 3]
5. Oath or Declaration [*Total Pages*]
   a. [ ] Newly executed (original or copy)
   b. [ ] Copy from a prior application (37 CFR 1.63 (d)) *(for continuation/divisional with Box 18 completed)*
      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. [ ] Application Data Sheet. See 37 CFR 1.76
7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program (*Appendix*)
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
   a. [ ] Computer Readable Form (CRF)
   b. Specification Sequence Listing on:
      i. [ ] CD-ROM or CD-R (2 copies); or
      ii. [ ] paper
   c. [ ] Statements verifying identity of above copies

ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
11. [ ] English Translation Document *(if applicable)*
12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
14. [X] Return Receipt Postcard (MPEP 503) *(Should be specifically itemized)*
15. [ ] Certified Copy of Priority Document(s) *(if foreign priority is claimed)*
16. [ ] Request and Certification under 35 U.S.C. 122 (b)(2)(B)(i). Applicant must attach form PTO/SB/35 or its equivalent.
17. [ ] Other: .....

18. If a CONTINUING APPLICATION, *check appropriate box, and supply the requisite information below and in a preliminary amendment, or in an Application Data Sheet under 37 CFR 1.76:*

[ ] Continuation [ ] Divisional [ ] Continuation-in-part (CIP) of prior application No: _____

Prior application information: *Examiner* _____ *Group Art Unit* _____

For CONTINUATION OR DIVISIONAL APPS only: The entire disclosure of the prior application, from which an oath or declaration is supplied under Box 5b, is considered a part of the disclosure of the accompanying continuation or divisional application and is hereby incorporated by reference. The incorporation can only be relied upon when a portion has been inadvertently omitted from the submitted application parts.

19. CORRESPONDENCE ADDRESS

[X] *Customer Number or Bar Code Label* 27964 *(Insert Customer No. or Attach bar code label here)* or [X] *Correspondence address below*

Name	Glenn W. Boisbrun				
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Signature		Date	09/28/2001

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FEE TRANSMITTAL for FY 2001

Patent fees are subject to annual revision.

TOTAL AMOUNT OF PAYMENT ($) 836.00

Complete if Known	
Application Number	N/A
Filing Date	Herewith
First Named Inventor	Richard L. McDowell
Examiner Name	N/A
Group Art Unit	N/A
Attorney Docket No.	R.L. MCDOWELL 20-76

METHOD OF PAYMENT

1. [X] The Commissioner is hereby authorized to charge indicated fees and credit any overpayments to:

Deposit Account Number: 501735

Deposit Account Name: Agere Systems Inc.

[X] Charge Any Additional Fee Required Under 37 CFR 1.16 and 1.17

[ ] Applicant claims small entity status. See 37 CFR 1.27

2. [ ] **Payment Enclosed:**

[ ] Check [ ] Credit card [ ] Money Order [ ] Other

FEE CALCULATION

1. BASIC FILING FEE

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
101	710	201	355	Utility filing fee	710.00
106	320	206	160	Design filing fee	
107	490	207	245	Plant filing fee	
108	710	208	355	Reissue filing fee	
114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 710.00

2. EXTRA CLAIM FEES

		Extra Claims		Fee from below	Fee Paid
Total Claims	27	-20** =	7	X 18.00	= 126.00
Independent Claims	3	- 3** =	0	X 80.00	= 0.00
Multiple Dependent					=

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	80	209	40	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 126.00

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension for reply within second month	
117	890	217	445	Extension for reply within third month	
118	1,390	218	695	Extension for reply within fourth month	
128	1,890	228	945	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,240	241	620	Petition to revive - unintentional	
142	1,240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	130	123	130	Petitions related to provisional applications	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	710	246	355	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	710	249	355	For each additional invention to be examined (37 CFR § 1.129(b))	
179	710	279	355	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid SUBTOTAL (3) ($) 0.00

SUBMITTED BY				Complete *(if applicable)*	
Name *(Print/Type)*	Glenn W. Boisbrun	Registration No *(Attorney/Agent)*	39,615	Telephone	(972) 480-8800
Signature				Date	09/28/2001

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Atty. Docket No. R.L. MCDOWELL 20-76 PATENT APPLICATION

A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

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A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention is directed, in general, to a mobile telecommunications device and, more specifically, to a system and method of determining a proximity transmit power level of a portable cell phone based on a proximity to a user.

BACKGROUND OF THE INVENTION

[0002] Since the inception of the wireless or cellular ("cell") phone in the late 1940's, cell phone usage has expanded beyond their utilitarian beginnings. Presently, cell phones are being used in every aspect of business along with every facet of personal life. People of all ages are now using cell phones as the price of cell phones and services decrease. Presently, more than 74 million cell phones are in use in the United States with estimates predicting more than 139 million in a few years. Cell phones are moving beyond communication tools, and are now taking a place in history by weaving themselves into the social fabric by becoming fashion statements and symbols of power and importance.

[0003] Along with the increase in usage has come the requests for improved service and communication quality. Consumers are now looking for more than just wireless voice communication but also Internet access, calendars, organizers, and even games. Meanwhile, manufacturers struggle to meet consumer demands for more options and better quality of service.

[0004] Typically, the quality of service of a cell phone is proportional to the transmit power level of the cell phone. Though no definite proof has been determined, health concerns have arisen due to the power used to transmit the radio frequency of cell phones when operated close to the body of a cell phone user. For example, when held close to the ear, many users have health concerns about the high levels of radio frequency energy causing damage to brain cells.

[0005] Most of the concerns from consumers center around using the cell phone close to the ear or head of a user. New studies, however, have also suggested that cell phone usage may possibly cause stomach cancer when located near the midsection when sending and receiving data text messaging. Cell phone users still want the best possible quality of service from their cell phone. However, health concerns regarding the transmit power of cell phones are now beginning to affect some users.

[0006] Manufacturers have tried several options to relieve the fears of consumers. One such option involves permanently reducing the power of the transmitter in cell phones. Though this may be perceived as a safety advantage to some customers, unfortunately, this also reduces the quality of service of the cell phone. Another option for consumers is the use of cell phones with a base that typically allows a higher transmit power level of up to three watts. This may be the case for a cell phone that is permanently mounted, such as in an automobile. These type of cell phones, however, do not allow the flexibility demanded by consumers that is found in the use of a portable cell phone.

[0007] Accordingly, what is needed in the art is a system and method to automatically reduce the transmit power level of a portable cell phone when located near a human body thereby decreasing the perception of health risks associated with the use thereof.

SUMMARY OF THE INVENTION

[0008] To address the above-discussed deficiencies of the prior art, the present invention provides a proximity regulation system for use with a portable cell phone. In one embodiment, the proximity regulation system includes a location sensing subsystem that is configured to determine a location of the portable cell phone proximate a user. A power governing subsystem is coupled to the location sensing subsystem and configured to determine a proximity transmit power level of the portable cell phone based on the location.

[0009] In another aspect, the present invention provides a method of operating a portable cell phone including determining a location of the portable cell phone proximate a user. The method further includes providing a control signal based on the location, and determining a proximity transmit power level of the portable cell phone based on the control signal.

[0010] In yet another aspect, the present invention provides a portable cell phone that includes a power circuit as a function of a position to a communications tower and a proximity regulation system. The proximity regulation system includes a location sensing subsystem that determines a location of the portable cell phone proximate a user. The proximity regulation system also

includes a power governing subsystem, coupled to the location sensing subsystem, that determines a proximity transmit power level of the portable cell phone based on the location.

[0011] The foregoing has outlined, rather broadly, preferred and alternative features of the present invention so that those skilled in the art may better understand the detailed description of the invention that follows. Additional features of the invention will be described hereinafter that form the subject of the claims of the invention. Those skilled in the art should appreciate that they can readily use the disclosed conception and specific embodiment as a basis for designing or modifying other structures for carrying out the same purposes of the present invention. Those skilled in the art should also realize that such equivalent constructions do not depart from the spirit and scope of the invention in its broadest form.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] For a more complete understanding of the present invention, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

[0013] FIGURE 1 illustrates a network diagram of an embodiment of a cellular telephone network employing a portable cell phone constructed in accordance with the principles of the present invention;

[0014] FIGURE 2 illustrates a block diagram of an embodiment of a portable cell phone employing a proximity regulation system constructed in accordance with the principles of the present invention; and

[0015] FIGURE 3 illustrates a flow diagram of an embodiment of a method of operating a portable cell phone constructed in accordance with the principles of the present invention.

DETAILED DESCRIPTION

[0016] Referring initially to FIGURE 1, illustrated is a network diagram of an embodiment of a cellular telephone network, generally designated 100, employing a portable cell phone 120 constructed in accordance with the principles of the present invention. The cellular telephone network 100 includes a communications tower 110 in communication with the portable cell phone 120, employable by a portable cell phone user 150. The portable cell phone 120 includes an antenna 125, a power circuit 130 and a proximity regulation system 140.

[0017] The communications tower 110 is a conventional communications tower that is positioned to communicate with the portable cell phone 120. The communications tower 110 may provide either analog or digital communications depending on the cellular telephone network 100 being used. For more information regarding communications towers and their use in cellular telephone networks, see "Mobile Communications Engineering: Theory and Applications" by William C. Y. Lee, McGraw Hill (1997), which is incorporated herein by reference.

[0018] In the illustrated embodiment, the portable cell phone 120 is a digital cell phone capable of receiving both voice and text messaging. In an alternative embodiment, the portable cell

phone 120 may also be capable of using a headset attachment to allow hands-free operation. The portable cell phone 120 may also attach to a belt clip for storage or for use in conjunction with a headset attachment. In addition, the portable cell phone 120 may also allow hands-free operation while stored in a cradle. The cradle may be a conventional cradle, which is constructed to hold or store the portable cell phone 120.

[0019] The antenna 125 is a conventional portable cell phone antenna that provides communications between the portable cell phone 120 and the communications tower 110. Through the antenna 125, the portable cell phone 120 sends and receives voice or data communications across the cellular telephone network 100 via the communications tower 110.

[0020] In the illustrated embodiment, the power circuit 130 may be a typical power circuit in the portable cell phone 120 that produces a transmit power level equivalent to, for instance, a maximum transmit power level of one watt. Through communications with the communications tower 110 employing the antenna 125, the power circuit 130 may also provide a network adjusted transmit power level that is lower than the maximum transmit power level of one watt. The network adjusted transmit power level is based on a transmit signal strength of a communications path between the communications tower 110 and the portable cell phone 120.

[0021] In an advantageous embodiment of the present invention, the power circuit 130 is further coupled to the proximity regulation system 140 that determines a proximity transmit power level of the portable cell phone 120 based on its location proximate the portable cell phone user 150. Though not illustrated in FIGURE 1, the proximity regulation system 140 includes a location sensing subsystem and a power governing subsystem, which cooperate to determine both the proximity transmit power level and when it may be employed. Both the location sensing subsystem and the power governing subsystem are more fully discussed with respect to FIGURE 2.

[0022] The proximity regulation system 140 in the illustrated embodiment, is a dedicated device that is constructed of special-purpose hardware employing a software program, which directs its operation. In an alternative embodiment, the proximity regulation system 140 may be integrated into a power algorithm employing software that controls the power circuit 130. The proximity regulation system 140 may be installed when the portable cell phone 120 is constructed. Alternatively, the proximity regulation system 140 may be an after market addition to the already constructed portable cell phone 120. In one embodiment, the proximity regulation system 140 may be installed with a switch that allows the portable cell phone user 150 to disengage the proximity

regulation system 140. In another embodiment, the proximity regulation system 140 may be used with a personal digital assistant or any other portable device that may emit radio frequency energy within the vicinity of a user.

[0023] The portable cell phone user 150 is typically anyone who uses a portable cell phone. This, of course, includes children through senior adults. In the illustrated embodiment, the portable cell phone user 150 is using the portable cell phone 120 proximate their head. Alternatively, the portable cell phone user 150 may use the portable cell phone 120 while attached to a belt clip or in conjunction with a headset. In another embodiment, the portable cell phone user 150 may use the portable cell phone 120 for data text messaging. In this case, the portable cell phone 120 may be typically located in front of the portable cell phone user 150 and within a distance of an arm's length. It is also contemplated that the portable cell phone 120 may transmit and receive other forms of multimedia communications such as video.

[0024] Turning now to FIGURE 2, illustrated is a block diagram of an embodiment of a portable cell phone, generally designated 200, employing a proximity regulation system 210 constructed in accordance with the principles of the present invention. The portable cell phone 200 includes the proximity regulation system 210, a power circuit 240, a headset operation mode input 250, a

belt clip sensor 260 and a data transfer operation mode circuit 270. The portable cell phone 200 is attached to a belt clip 280 having a position indicator 290. The proximity regulation system 210 includes a location sensing subsystem 220 and a power governing subsystem 230.

[0025] The proximity regulation system 210 determines a proximity transmit power level of the portable cell phone 200 based on the location of the portable cell phone 200 proximate a portable cell phone user. In the illustrated embodiment, the proximity regulation system 210 is a dedicated device that is solely hardwired. As discussed above with respect to FIGURE 1, the proximity regulation system 210 is coupled to the power circuit 240. Additionally, the proximity regulation system 210 is coupled to the headset operation mode input 250, the belt clip sensor 260 and the data transfer operation mode circuit 270. Of course, a portable cell phone may still employ the proximity regulation system 210 without the headset operation mode input 250, the belt clip sensor 260 or the data transfer operation mode circuit 270.

[0026] The location sensing subsystem 220 is coupled to the power governing subsystem 230, and determines a location of the portable cell phone 200 proximate a user. In the illustrated embodiment, the location sensing subsystem 220 is embodied in an integrated circuit. In another embodiment, the location sensing

subsystem 220 may be embodied as a sequence of operating instructions.

[0027] In an exemplary embodiment, the location sensing subsystem 220 determines that the portable cell phone 200 is proximate the head of the user if there is no indication that the portable cell phone 200 is in a data transfer operation mode, a headset operation mode or located on a belt clip. In another embodiment, the location sensing subsystem 220 may determine if the portable cell phone 200 is proximate the head of the user through a designated sensor 225 located on the portable cell phone 200.

[0028] The designated sensor 225 may be an inductively coupled loop that changes a surrounding magnetic field when in the vicinity of the user's head. The change in the magnetic field creates a change in the inductive coupling thereby causing an impedance change associated with the inductively coupled loop. The impedance change may affect the current flow in the inductively coupled loop, which can be used to indicate the proximity of the portable cell phone 200 to the user's head.

[0029] In an alternative embodiment, the designated sensor 225 may also be a contact sensor that indicates proximity of the portable cell phone 200 to the user's head when the portable cell phone 200 is touching the user's ear. The contact sensor may also indicate proximity of the portable cell phone 200 to the user by

contact from the user's hand. One skilled in the pertinent art will understand that other sensors may be used to indicate the proximity of the portable cell phone 200 to the user's body.

[0030] In an alternative embodiment, the location sensing subsystem 220 determines that the portable cell phone 200 is proximate the body of the user when receiving an indication from the data transfer operation mode circuit 270. Additionally, the location sensing subsystem 220 may determine that the portable cell phone 200 is proximate the body of the user if the portable cell phone 200 is located on the belt clip 280 or a headset is inserted in the headset operation mode input 250. Still, another embodiment may indicate that the portable cell phone 200 is away from the body of the user when the portable cell phone 200 is in a cradle.

[0031] The power governing subsystem 230 is coupled to the location sensing subsystem 220. The power governing subsystem 230 determines the proximity transmit power level of the portable cell phone 200 based on the location of the portable cell phone 200 as determined by the location sensing subsystem 220. In one embodiment, the network adjusted transmit power level may be reduced to a value determined by the proximity transmit power level when the location of the portable cell phone 200 is within the vicinity of the user's head. In another embodiment, the network adjusted transmit power level may be similarly reduced when the

location of the portable cell phone 200 is just within the vicinity of a user's body.

[0032] In another embodiment, the proximity transmit power level may match the network adjusted transmit power level, which may be the maximum transmit power level of, for instance, one watt, when the portable cell phone 200 is operating in the headset operation mode or the data transfer mode. In still another embodiment, the proximity transmit power level may be further reduced when the portable cell phone user is a child. A switch 235 may be installed on the portable cell phone 200 to allow this user option. Additionally, the switch 235 may also allow the user to disengage the proximity regulation system 210 whenever desired. In one embodiment, the switch 235 may be a standard software switch that the user controls through a display and a keypad of the portable cell phone 200.

[0033] The headset operation mode input 250 is a conventional receptacle for receiving a headset that allows hands-free operation. As mentioned above, the headset operation mode input 250 is coupled to the proximity regulation system 210. The location sensing subsystem 220 of the proximity regulation system 210 receives an indication that the headset is in use from the headset operation mode input 250 when a headset is inserted. In one embodiment, the location sensing subsystem 220 determines that

the portable cell phone 200 is not within the vicinity of the head of the user upon receiving indication from the headset operation mode input 250.

[0034] In another embodiment, the location sensing subsystem 220 may determine that the portable cell phone 200 is within the vicinity of the user's body if the headset is inserted in the headset operation mode input 250. In an alternative embodiment, the location sensing subsystem 220 may determine that the headset operation mode input 250 may be used in conjunction with the belt clip sensor 260 to indicate that the portable cell phone 200 is proximate the user's body.

[0035] The belt clip sensor 260 is coupled to the proximity regulation system 210 and indicates when the portable cell phone 200 is located within the belt clip 280. The belt clip sensor 260 may be a contact sensor that is depressed by a protrusion on the belt clip 280 when placed in the belt clip 280. In an alternative embodiment, the belt clip sensor 260 may use an inductively coupled loop constructed to indicate to the location sensing subsystem 220 that the portable cell phone 200 is in the belt clip 280.

[0036] The data transfer operation mode circuit 270 is coupled to the proximity regulation system 210 and indicates to the location sensing subsystem 220 of the proximity regulation system 210 when the portable cell phone 200 is being used for data text

messaging. As mentioned above with respect to the discussion of the antenna 125 of FIGURE 1, the data text messaging may be received from a communications network via an antenna such as those shown in FIGURE 1.

[0037] The belt clip 280 is a conventional device for holding the portable cell phone 200. The belt clip 280 is typically constructed of plastic and constructed to attach to a user's belt. The belt clip 280 may hold the portable cell phone 200 when the user is not using the portable cell phone 200. In alternative embodiments, the belt clip 280 may hold the portable cell phone 200 when the headset is being employed. In other embodiments, another type of clip may be used by the user to hold the portable cell phone 200. For example, instead of the belt clip 280, the user may store the portable cell phone 200 in a clip that attaches to a shirt pocket or an arm band.

[0038] The position indicator 290 of the belt clip 280 may be a protrusion that depresses the belt clip sensor 260 on the portable cell phone 200 to indicate to the location sensing subsystem 220 that the portable cell phone 200 is positioned in the belt clip 280. In an alternative embodiment, the position indicator 290 may be a metallic insert that varies the magnetic field of an inductively coupled loop of the belt clip sensor 260. It should be noted that other pertinent components not shown may be included

within the portable cell phone 200 without departing from the scope of the present invention.

[0039] Turning now to FIGURE 3, illustrated is a flow diagram of an embodiment of a method, generally designated 300, of operating a portable cell phone constructed in accordance with the principles of the present invention. The method 300 starts in a step 305 with an intent to operate a portable cell phone.

[0040] Following the step 305, the portable cell phone determines its location proximate a user in a step 310. In one embodiment, the location may be determined by a designated sensor that indicates the proximity of the portable cell phone to a user's head. In alternative embodiments, the location may be determined by other sensors including a belt clip sensor, a cradle sensor, or a headset sensor.

[0041] After determining proximity to the user, the portable cell phone provides a control signal in a step 320. The control signal may, for instance, be either a voltage level or current level that is designated to correspond to the previously determined location. Those skilled in the pertinent art will understand the use of control signals to represent a determined condition.

[0042] After providing a control signal, the portable cell phone determines if the control signal indicates proximity of the portable cell phone to the user in a first decisional step 330. In

one embodiment, various control signals may be designated to correspond to different locations of the portable cell phone proximate the portable cell phone user. For example, one control signal may represent that the portable cell phone is in the vicinity of the user's head. Another control signal may be used to represent that the portable cell phone is in the vicinity of the user's body. In alternative embodiments, the control signal may represent that the portable cell phone is not within the vicinity of the user's body.

[0043] In the illustrated embodiment, if it is determined that the portable cell phone is proximate the user, then the transmit power level is reduced as determined by a value of a proximity transmit power level, in a step 340. In one embodiment, the transmit power level may be reduced to one network adjusted transmit power level whenever the portable cell phone is within the vicinity of any part of the user's body. In another embodiment, the transmit power level may be reduced to various allowable proximity transmit power levels depending on the vicinity of the portable cell phone to different parts of the user's body.

[0044] After adjusting the transmit power level, the portable cell phone then transmits at a reduced level in a step 350. In one embodiment, the adjusted transmit power level may not exceed the network adjusted transmit power level as determined by the

communications path between the portable cell phone and the communications tower. In other embodiments, the adjusted transmit power level may be reduced to the proximity transmit power level. Finally, the transmission of the portable cell phone ends in a step 370.

[0045] Returning now to the first decisional step 330, if the portable cell phone is not proximate the user, then the method 300 proceeds to a step 360 wherein the portable cell phone transmits at the network adjusted transmit power level. In one embodiment, the network adjusted transmit power level may equal the maximum transmit power level of a portable cell phone. In other embodiments, the network adjusted transmit power level may be a reduction from the maximum transmit power level due to the communications path between the communications tower and the portable cell phone. After transmitting in step 370, the method 300 ends in the previously mentioned step 360.

[0046] Although the present invention has been described in detail, those skilled in the art should understand that they can make various changes, substitutions and alterations herein without departing from the spirit and scope of the invention in its broadest form.

WHAT IS CLAIMED IS:

1. For use with a portable cell phone, a proximity regulation system, comprising:

a location sensing subsystem configured to determine a location of said portable cell phone proximate a user; and

a power governing subsystem, coupled to said location sensing subsystem, configured to determine a proximity transmit power level of said portable cell phone based on said location.

2. The proximity regulation system as recited in Claim 1 wherein said proximity transmit power level is reduced when said location is within a vicinity of a user's head.

3. The proximity regulation system as recited in Claim 1 wherein said proximity transmit power level is limited to a predetermined maximum level.

4. The proximity regulation system as recited in Claim 1 wherein said proximity transmit power level is maximum when said portable cell phone is operating in a headset operation mode or data transfer operation mode.

5. The proximity regulation system as recited in Claim 1 wherein said portable cell phone is located on a belt-clip of said user.

6. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem or said power governing subsystem is embodied in an integrated circuit.

7. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem or said power governing subsystem is embodied in a sequence of operating instructions.

8. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem determines said location by employing a sensor selected from the group consisting of:

a designated sensor,

a contact sensor,

a belt clip sensor, and

a cradle sensor.

9. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem determines said location by ascertaining a mode of operation of said portable cell phone.

10. A method of operating a portable cell phone, comprising:

determining a location of said portable cell phone proximate a user;

providing a control signal based on said location; and

determining a proximity transmit power level of said portable cell phone based on said control signal.

11. The method as recited in Claim 10 wherein said proximity transmit power level is reduced when said location is within a vicinity of a user's head.

12. The method as recited in Claim 10 wherein said proximity transmit power level is limited to a predetermined maximum level.

13. The method as recited in Claim 10 wherein said proximity transmit power level is maximum when said portable cell phone is operating in a headset operation mode or data transfer operation mode.

14. The method as recited in Claim 10 wherein said portable cell phone is located on a belt-clip of said user.

15. The method as recited in Claim 10 wherein said determining said location is performed by a location sensing subsystem embodied in an integrated circuit.

16. The method as recited in Claim 10 wherein said determining a proximity transmit power level is performed by a power governing subsystem embodied in a sequence of operating instructions.

17. The method as recited in Claim 10 wherein said determining a location employs a sensor selected from the group consisting of:

a designated sensor,

a contact sensor,

a belt clip sensor, and

a cradle sensor.

18. The method as recited in Claim 10 wherein said determining a location is performed by ascertaining a mode of operation of said portable cell phone.

19. A portable cell phone, comprising:

a power circuit that provides a network adjusted transmit power level as a function of a position to a communications tower; and

a proximity regulation system, including:

a location sensing subsystem that determines a location of said portable cell phone proximate a user; and

a power governing subsystem, coupled to said location sensing subsystem, that determines a proximity transmit power level of said portable cell phone based on said location.

20. The portable cell phone as recited in Claim 19 wherein said proximity transmit power level is reduced when said location is within a vicinity of a user's head.

21. The portable cell phone as recited in Claim 19 wherein said proximity transmit power level is limited to a predetermined maximum level.

22. The portable cell phone as recited in Claim 19 wherein said proximity transmit power level is maximum when said portable cell phone is operating in a headset operation mode or data transfer operation mode.

23. The portable cell phone as recited in Claim 19 wherein said portable cell phone is located on a belt-clip of said user.

24. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem or said power governing subsystem is embodied in an integrated circuit.

25. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem or said power governing subsystem is embodied in a sequence of operating instructions.

26. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem determines said location by employing a sensor selected from the group consisting of:

a designated sensor,

a contact sensor,

a belt clip sensor, and

a cradle sensor.

27. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem determines said location by ascertaining a mode of operation of said portable cell phone.

A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

ABSTRACT OF THE DISCLOSURE

A proximity regulation system for use with a portable cell phone and a method of operating the same. In one embodiment, the proximity regulation system includes a location sensing subsystem that is configured to determine a location of the portable cell phone proximate a user. A power governing subsystem is coupled to the location sensing subsystem and configured to determine a proximity transmit power level of the portable cell phone based on the location.

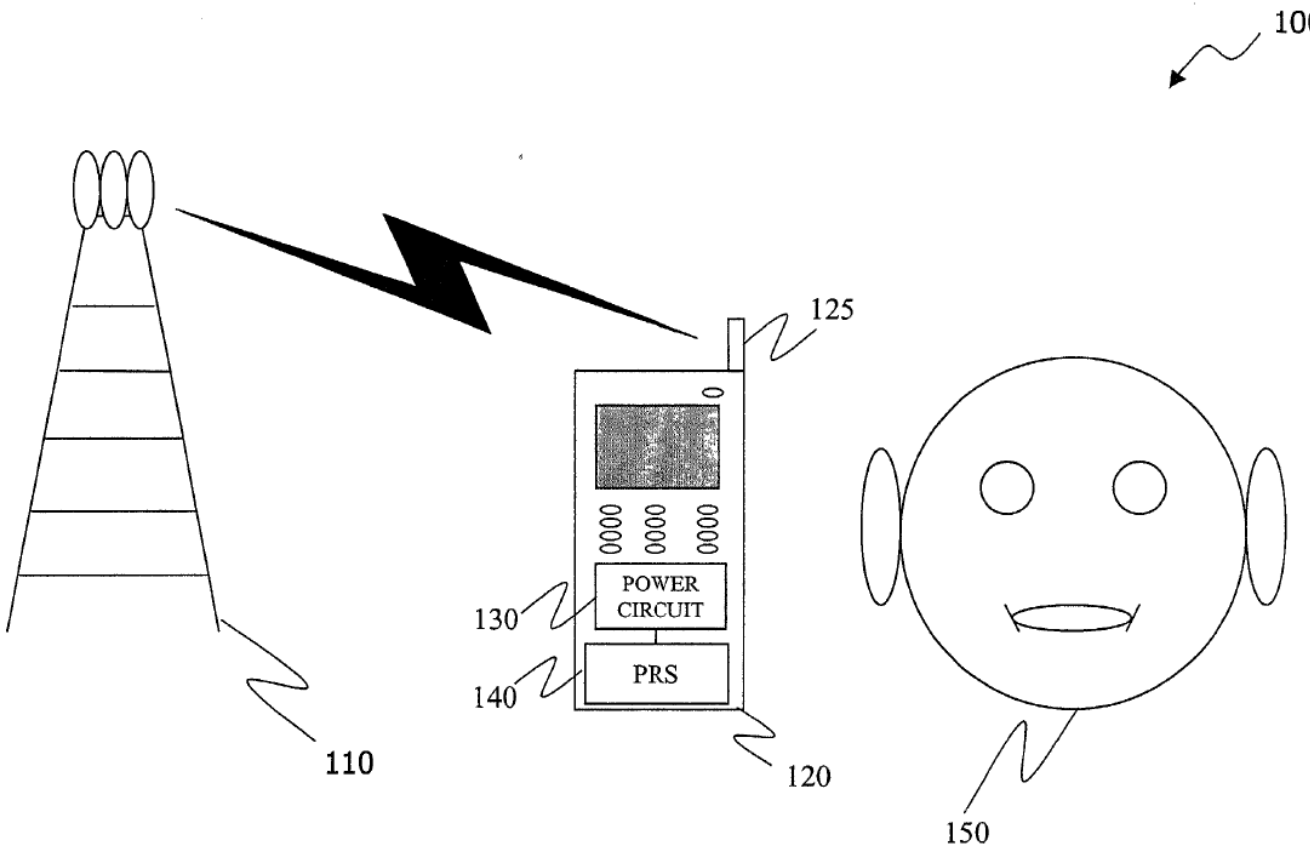


FIGURE 1

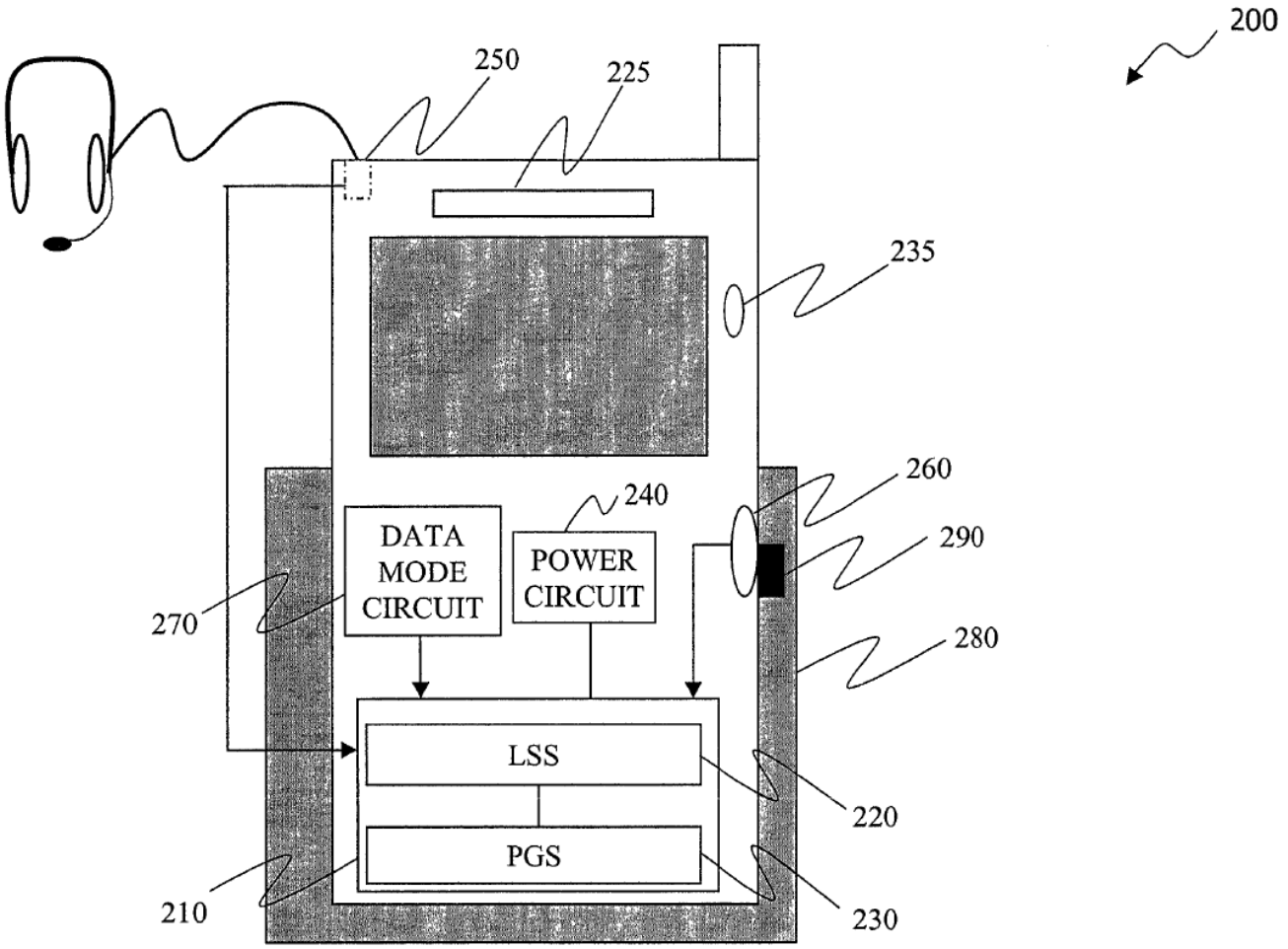
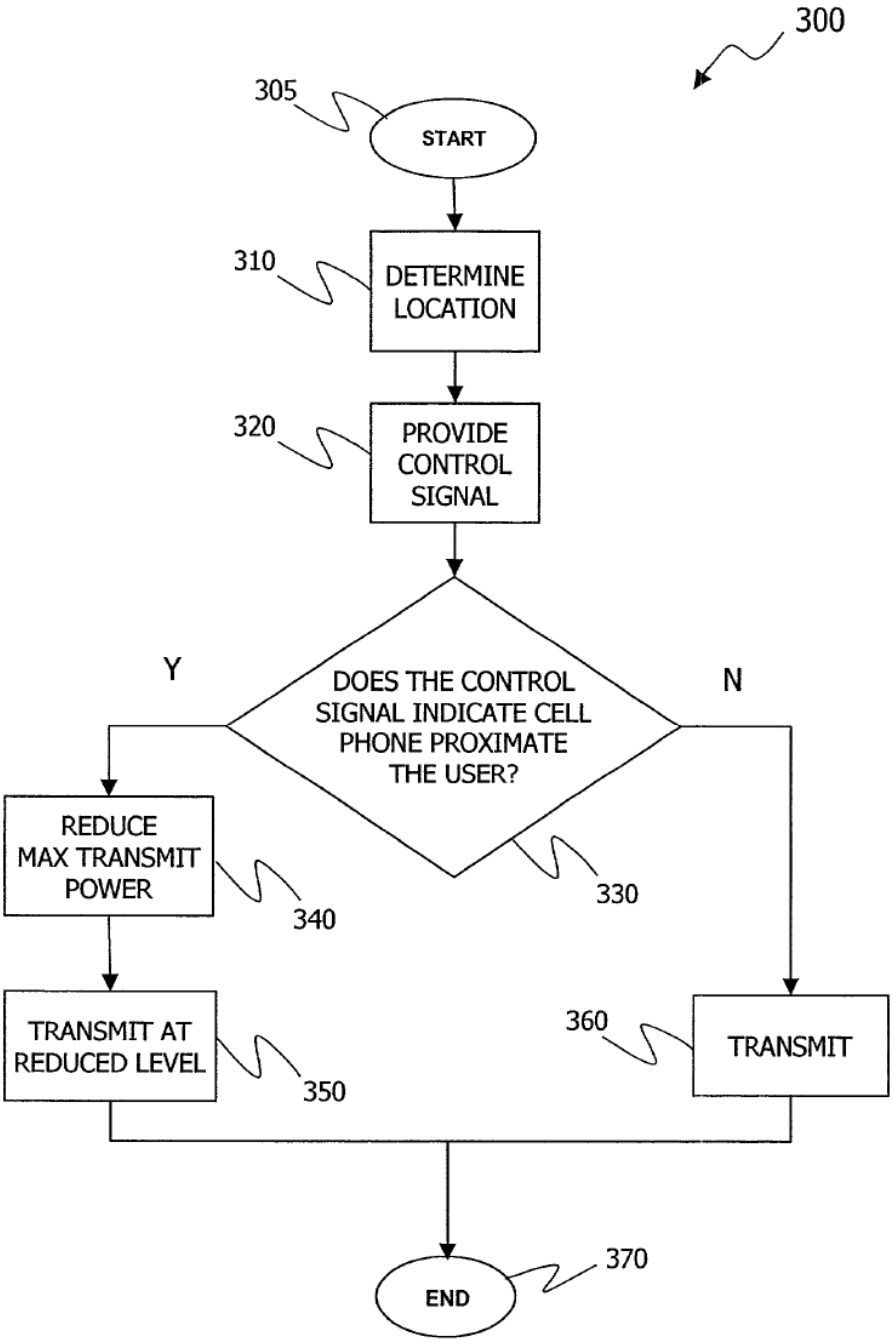


FIGURE 2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START
310
DETERMINE LOCATION
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PROVIDE CONTROL SIGNAL
DOES THE CONTROL SIGNAL INDICATE CELL PHONE PROXIMATE THE USER?
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Y
N
REDUCE MAX TRANSMIT POWER
340
TRANSMIT AT REDUCED LEVEL
350
360
TRANSMIT
370
END

FIGURE 3

Jc971 U.S. PTO 09/967140 09/28/01

Subclass	ISSUE CLASSIFICATION
Class	

PATENT NUMBER

U.S. UTILITY PATENT APPLICATION

O.I.P.E.	PATENT DATE
SCANNED 11-3 Q.A. Am	

APPLICATION NO.	CONT/PRIOR	CLASS	SUBCLASS	ART UNIT	EXAMINER
09/967140		455	456	2681 2.01 3	Persino

APPLICANTS: Richard McDowell
Philip Mooney

TITLE: Proximity regulation system for use with a portable cell phone and a method of operation thereof

PTO-2040 12/98

PREPARED AND APPROVED FOR ISSUE

ISSUING CLASSIFICATION

ORIGINAL		CROSS REFERENCE(S)	
CLASS	SUBCLASS	CLASS	SUBCLASS (ONE SUBCLASS PER BLOCK)
INTERNATIONAL CLASSIFICATION			
			☐ Continued on Issue Slip Inside File Jacket

☐ TERMINAL DISCLAIMER	DRAWINGS			CLAIMS ALLOWED	
	Sheets Drwg.	Figs. Drwg.	Print Fig.	Total Claims	Print Claim for O.G.
☐ a) The term of this patent subsequent to _____ (date) has been disclaimed.	_____ (Assistant Examiner)		_____ (Date)	NOTICE OF ALLOWANCE MAILED	
☐ b) The term of this patent shall not extend beyond the expiration date of U.S Patent. No. _____	_____ (Primary Examiner)		_____ (Date)	ISSUE FEE: Amount Due	Date Paid
☐ c) The terminal ____months of this patent have been disclaimed.	_____ (Legal Instruments Examiner)		_____ (Date)	ISSUE BATCH NUMBER	

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(LABEL AREA)

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[redacted]

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Class	Sub.	Date	Exmr.
455	522 456.1 574 575.5	08/04/04	T.V.

INTERFERENCE SEARCHED

Class	Sub.	Date	Exmr.

SEARCH NOTES
(INCLUDING SEARCH STRATEGY)

	Date	Exmr.
LEE. Nguyen AU 2682	08/04/04	T.V.
BINH TIEU AU2643	08/05/04	T.V.

(RIGHT OUTSIDE)

ISSUE SLIP STAPLE AREA (for additional cross references)

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FEE DETERMINATION	SE		10-3-01
O.I.P.E. CLASSIFIER		32	10/12
FORMALITY REVIEW	Hayat HL	7600 1074	10-26-01

03/11/02

INDEX OF CLAIMS

✔ ..... Rejected
= ..... Allowed
— (Through numeral) Canceled
÷ ..... Restricted

N ..... Non-elected
I ..... Interference
A ..... Appeal
O ..... Objected

Claim Final	Claim Original	Date
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	2	✓
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If more than 150 claims or 10 actions staple additional sheet here

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UTILITY PATENT APPLICATION TRANSMITTAL

(Only for new nonprovisional applications under 37 CFR 1.53(b))

Attorney Docket No.	R.L. MCDOWELL 20-76
First Inventor	Richard L. McDowell
Title	A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF
Express Mail Label No.	EL843410469US

APPLICATION ELEMENTS

See MPEP chapter 600 concerning utility patent application contents.

ADDRESS TO: Assistant Commissioner for Patents, Box Patent Application, Washington, DC 20231

1. [X] Fee Transmittal Form (e.g., PTO/SB/17) *(Submit an original and a duplicate for fee processing)*
2. [ ] Applicant claims small entity status. See 37 CFR 1.27.
3. [X] Specification [*Total Pages* 28] *(preferred arrangement set forth below)*
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   - Cross Reference to Related Applications
   - Statement Regarding Fed sponsored R & D
   - Reference to sequence listing, a table, or a computer program listing appendix
   - Background of the Invention
   - Brief Summary of the Invention
   - Brief Description of the Drawings (*if filed*)
   - Detailed Description
   - Claim(s)
   - Abstract of the Disclosure
4. [X] Drawing(s) *(35 U.S.C. 113)* [*Total Sheets* 3]
5. Oath or Declaration [*Total Pages*]
   a. [ ] Newly executed (original or copy)
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      i. [ ] DELETION OF INVENTOR(S) Signed statement attached deleting inventor(s) named in the prior application, see 37 CFR 1.63(d)(2) and 1.33(b).
6. [ ] Application Data Sheet. See 37 CFR 1.76
7. [ ] CD-ROM or CD-R in duplicate, large table or Computer Program (*Appendix*)
8. Nucleotide and/or Amino Acid Sequence Submission *(if applicable, all necessary)*
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   b. Specification Sequence Listing on:
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      ii. [ ] paper
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ACCOMPANYING APPLICATION PARTS

9. [ ] Assignment Papers (cover sheet & document(s))
10. [ ] 37 CFR 3.73(b) Statement *(when there is an assignee)* [ ] Power of Attorney
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12. [ ] Information Disclosure Statement (IDS)/PTO-1449 [ ] Copies of IDS Citations
13. [ ] Preliminary Amendment
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Prior application information: *Examiner* _____ *Group Art Unit:* _____

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19. CORRESPONDENCE ADDRESS

[X] *Customer Number or Bar Code Label* 27964 *(Insert Customer No. or Attach bar code label here)* or [X] *Correspondence address below*

Name	Glenn W. Boisbrun				
Address	Hitt Gaines & Boisbrun, P.C.				
	P.O. Box 832570				
City	Richardson	State	Texas	Zip Code	75083
Country		Telephone	(972) 480-8800	Fax	(972) 480-8865

Name (Print/Type)	Glenn W. Boisbrun	Registration No. (Attorney/Agent)	39,615
Signature		Date	09/28/2001

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Application Number	N/A
Filing Date	Herewith
First Named Inventor	Richard L. McDowell
Examiner Name	N/A
Group Art Unit	N/A
Attorney Docket No.	R.L. MCDOWELL 20-76

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107	490	207	245	Plant filing fee	
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114	150	214	75	Provisional filing fee	

SUBTOTAL (1) ($) 710.00

2. EXTRA CLAIM FEES

			Extra Claims		Fee from below	=	Fee Paid
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Independent Claims	3	- 3** =	0	X	80.00	=	0.00
Multiple Dependent						=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	80	209	40	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

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105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension for reply within second month	
117	890	217	445	Extension for reply within third month	
118	1,390	218	695	Extension for reply within fourth month	
128	1,890	228	945	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,240	241	620	Petition to revive - unintentional	
142	1,240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	130	123	130	Petitions related to provisional applications	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	710	246	355	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	710	249	355	For each additional invention to be examined (37 CFR § 1.129(b))	
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169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 0.00

SUBMITTED BY				Complete *(if applicable)*	
Name (Print/Type)	Glenn W. Boisbrun	Registration No. (Attorney/Agent)	39,615	Telephone	(972) 480-8800
Signature				Date	09/28/2001

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Prior application information: *Examiner* _____ *Group Art Unit:* _____

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Name	Glenn W. Boisbrun				
Address	Hitt Gaines & Boisbrun, P.C.				
	P.O. Box 832570				
City	Richardson	State	Texas	Zip Code	75083
Country		Telephone	(972) 480-8800	Fax	(972) 480-8865

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SUBTOTAL (1) ($) 710.00

2. EXTRA CLAIM FEES

		Extra Claims		Fee from below		Fee Paid
Total Claims	27	-20** = 7	X	18.00	=	126.00
Independent Claims	3	- 3** = 0	X	80.00	=	0.00
Multiple Dependent					=	

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description
103	18	203	9	Claims in excess of 20
102	80	202	40	Independent claims in excess of 3
104	270	204	135	Multiple dependent claim, if not paid
109	80	209	40	** Reissue independent claims over original patent
110	18	210	9	** Reissue claims in excess of 20 and over original patent

SUBTOTAL (2) ($) 126.00

**or number previously paid, if greater; For Reissues, see above

FEE CALCULATION (continued)

3. ADDITIONAL FEES

Large Entity Fee Code	Large Entity Fee ($)	Small Entity Fee Code	Small Entity Fee ($)	Fee Description	Fee Paid
105	130	205	65	Surcharge - late filing fee or oath	
127	50	227	25	Surcharge - late provisional filing fee or cover sheet	
139	130	139	130	Non-English specification	
147	2,520	147	2,520	For filing a request for *ex parte* reexamination	
112	920*	112	920*	Requesting publication of SIR prior to Examiner action	
113	1,840*	113	1,840*	Requesting publication of SIR after Examiner action	
115	110	215	55	Extension for reply within first month	
116	390	216	195	Extension for reply within second month	
117	890	217	445	Extension for reply within third month	
118	1,390	218	695	Extension for reply within fourth month	
128	1,890	228	945	Extension for reply within fifth month	
119	310	219	155	Notice of Appeal	
120	310	220	155	Filing a brief in support of an appeal	
121	270	221	135	Request for oral hearing	
138	1,510	138	1,510	Petition to institute a public use proceeding	
140	110	240	55	Petition to revive - unavoidable	
141	1,240	241	620	Petition to revive - unintentional	
142	1,240	242	620	Utility issue fee (or reissue)	
143	440	243	220	Design issue fee	
144	600	244	300	Plant issue fee	
122	130	122	130	Petitions to the Commissioner	
123	130	123	130	Petitions related to provisional applications	
126	180	126	180	Submission of Information Disclosure Stmt	
581	40	581	40	Recording each patent assignment per property (times number of properties)	
146	710	246	355	Filing a submission after final rejection (37 CFR § 1.129(a))	
149	710	249	355	For each additional invention to be examined (37 CFR § 1.129(b))	
179	710	279	355	Request for Continued Examination (RCE)	
169	900	169	900	Request for expedited examination of a design application	

Other fee (specify) _____

*Reduced by Basic Filing Fee Paid **SUBTOTAL (3)** ($) 0.00

SUBMITTED BY				Complete *(if applicable)*	
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Signature				Date	09/28/2001

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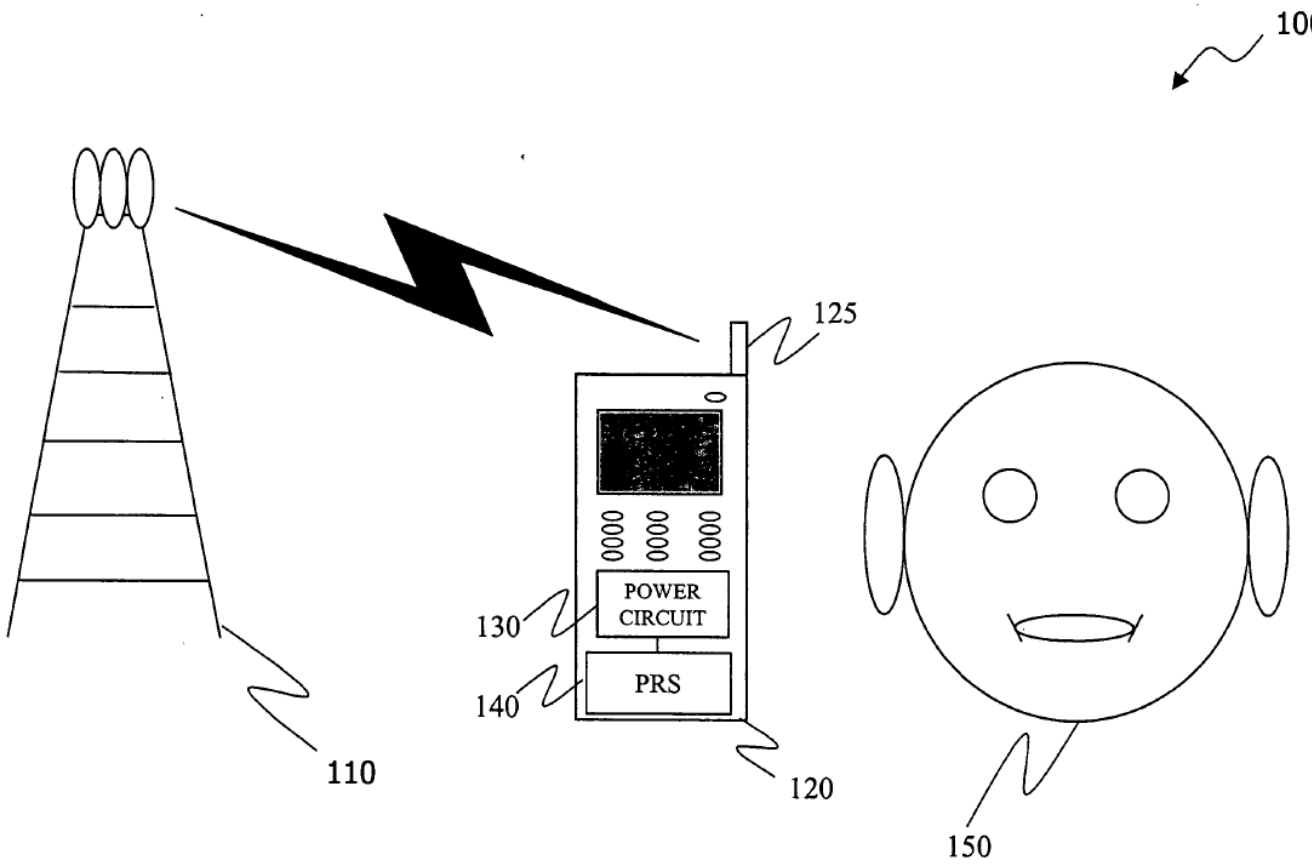

FIGURE 1

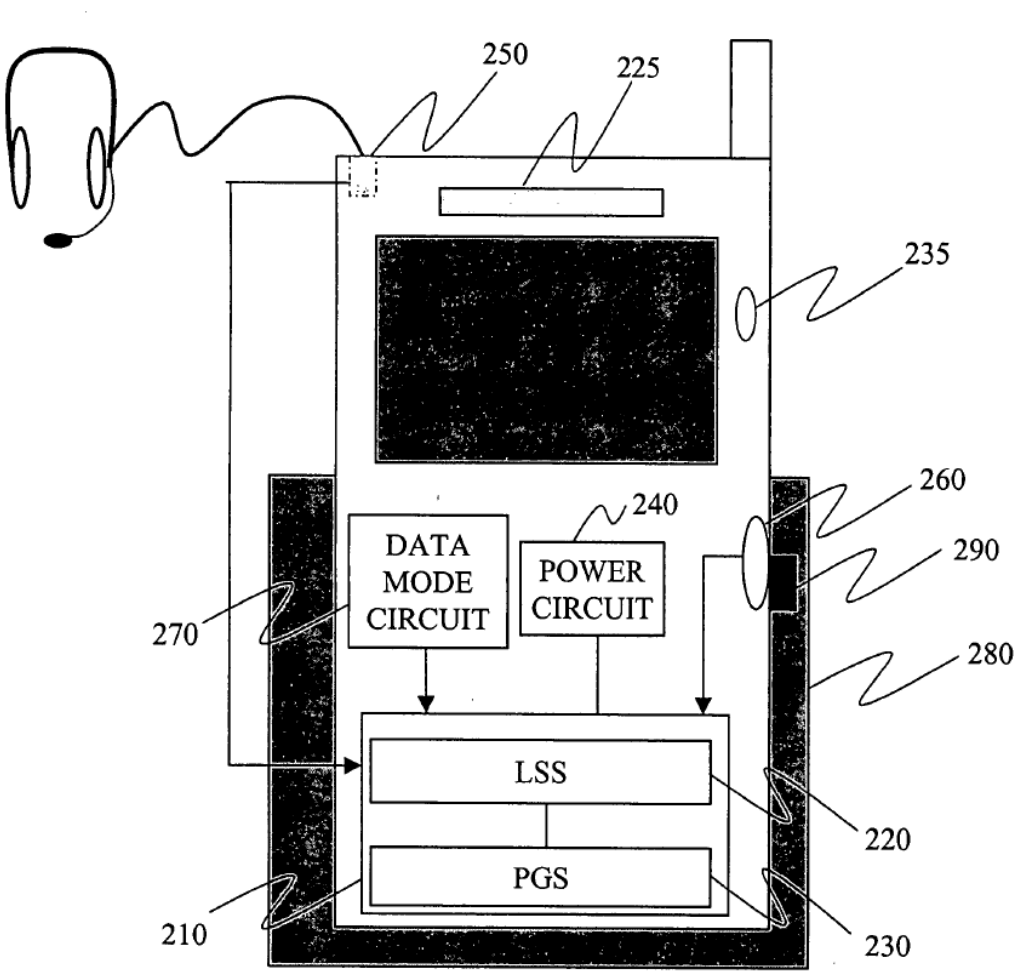

FIGURE 2

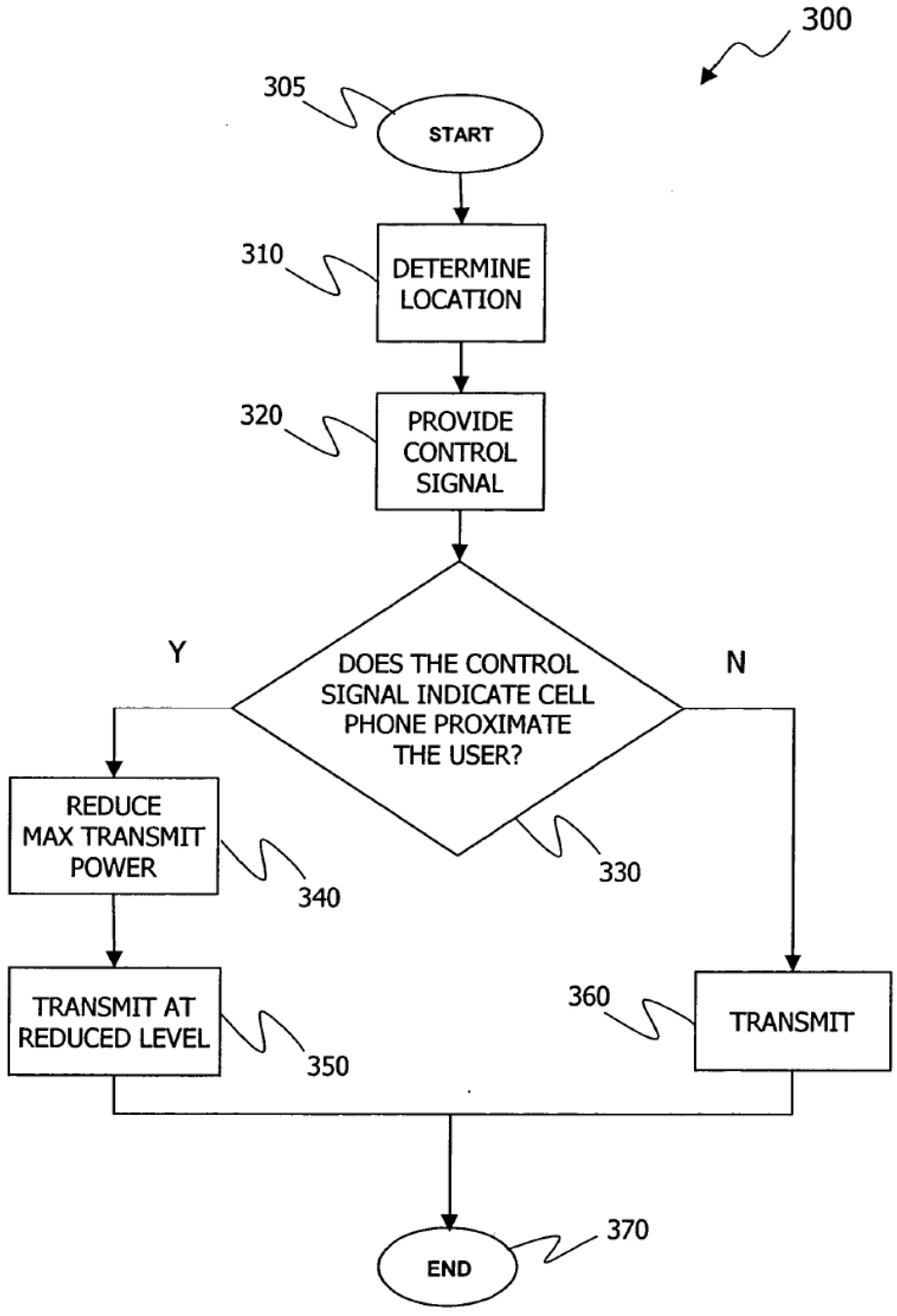
300
305
START
310
DETERMINE LOCATION
320
PROVIDE CONTROL SIGNAL
DOES THE CONTROL SIGNAL INDICATE CELL PHONE PROXIMATE THE USER?
330
Y
N
REDUCE MAX TRANSMIT POWER
340
TRANSMIT AT REDUCED LEVEL
350
360
TRANSMIT
370
END

FIGURE 3

Atty. Docket No. R.L. MCDOWELL 20-76 PATENT APPLICATION

A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

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A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

TECHNICAL FIELD OF THE INVENTION

[0001] The present invention is directed, in general, to a mobile telecommunications device and, more specifically, to a system and method of determining a proximity transmit power level of a portable cell phone based on a proximity to a user.

BACKGROUND OF THE INVENTION

[0002] Since the inception of the wireless or cellular ("cell") phone in the late 1940's, cell phone usage has expanded beyond their utilitarian beginnings. Presently, cell phones are being used in every aspect of business along with every facet of personal life. People of all ages are now using cell phones as the price of cell phones and services decrease. Presently, more than 74 million cell phones are in use in the United States with estimates predicting more than 139 million in a few years. Cell phones are moving beyond communication tools, and are now taking a place in history by weaving themselves into the social fabric by becoming fashion statements and symbols of power and importance.

[0003] Along with the increase in usage has come the requests for improved service and communication quality. Consumers are now looking for more than just wireless voice communication but also Internet access, calendars, organizers, and even games. Meanwhile, manufacturers struggle to meet consumer demands for more options and better quality of service.

[0004] Typically, the quality of service of a cell phone is proportional to the transmit power level of the cell phone. Though no definite proof has been determined, health concerns have arisen due to the power used to transmit the radio frequency of cell phones when operated close to the body of a cell phone user. For example, when held close to the ear, many users have health concerns about the high levels of radio frequency energy causing damage to brain cells.

[0005] Most of the concerns from consumers center around using the cell phone close to the ear or head of a user. New studies, however, have also suggested that cell phone usage may possibly cause stomach cancer when located near the midsection when sending and receiving data text messaging. Cell phone users still want the best possible quality of service from their cell phone. However, health concerns regarding the transmit power of cell phones are now beginning to affect some users.

[0006] Manufacturers have tried several options to relieve the fears of consumers. One such option involves permanently reducing the power of the transmitter in cell phones. Though this may be perceived as a safety advantage to some customers, unfortunately, this also reduces the quality of service of the cell phone. Another option for consumers is the use of cell phones with a base that typically allows a higher transmit power level of up to three watts. This may be the case for a cell phone that is permanently mounted, such as in an automobile. These type of cell phones, however, do not allow the flexibility demanded by consumers that is found in the use of a portable cell phone.

[0007] Accordingly, what is needed in the art is a system and method to automatically reduce the transmit power level of a portable cell phone when located near a human body thereby decreasing the perception of health risks associated with the use thereof.

SUMMARY OF THE INVENTION

[0008] To address the above-discussed deficiencies of the prior art, the present invention provides a proximity regulation system for use with a portable cell phone. In one embodiment, the proximity regulation system includes a location sensing subsystem that is configured to determine a location of the portable cell phone proximate a user. A power governing subsystem is coupled to the location sensing subsystem and configured to determine a proximity transmit power level of the portable cell phone based on the location.

[0009] In another aspect, the present invention provides a method of operating a portable cell phone including determining a location of the portable cell phone proximate a user. The method further includes providing a control signal based on the location, and determining a proximity transmit power level of the portable cell phone based on the control signal.

[0010] In yet another aspect, the present invention provides a portable cell phone that includes a power circuit as a function of a position to a communications tower and a proximity regulation system. The proximity regulation system includes a location sensing subsystem that determines a location of the portable cell phone proximate a user. The proximity regulation system also

includes a power governing subsystem, coupled to the location sensing subsystem, that determines a proximity transmit power level of the portable cell phone based on the location.

[0011] The foregoing has outlined, rather broadly, preferred and alternative features of the present invention so that those skilled in the art may better understand the detailed description of the invention that follows. Additional features of the invention will be described hereinafter that form the subject of the claims of the invention. Those skilled in the art should appreciate that they can readily use the disclosed conception and specific embodiment as a basis for designing or modifying other structures for carrying out the same purposes of the present invention. Those skilled in the art should also realize that such equivalent constructions do not depart from the spirit and scope of the invention in its broadest form.

BRIEF DESCRIPTION OF THE DRAWINGS

[0012] For a more complete understanding of the present invention, reference is now made to the following descriptions taken in conjunction with the accompanying drawings, in which:

[0013] FIGURE 1 illustrates a network diagram of an embodiment of a cellular telephone network employing a portable cell phone constructed in accordance with the principles of the present invention;

[0014] FIGURE 2 illustrates a block diagram of an embodiment of a portable cell phone employing a proximity regulation system constructed in accordance with the principles of the present invention; and

[0015] FIGURE 3 illustrates a flow diagram of an embodiment of a method of operating a portable cell phone constructed in accordance with the principles of the present invention.

DETAILED DESCRIPTION

[0016] Referring initially to FIGURE 1, illustrated is a network diagram of an embodiment of a cellular telephone network, generally designated 100, employing a portable cell phone 120 constructed in accordance with the principles of the present invention. The cellular telephone network 100 includes a communications tower 110 in communication with the portable cell phone 120, employable by a portable cell phone user 150. The portable cell phone 120 includes an antenna 125, a power circuit 130 and a proximity regulation system 140.

[0017] The communications tower 110 is a conventional communications tower that is positioned to communicate with the portable cell phone 120. The communications tower 110 may provide either analog or digital communications depending on the cellular telephone network 100 being used. For more information regarding communications towers and their use in cellular telephone networks, see "Mobile Communications Engineering: Theory and Applications" by William C. Y. Lee, McGraw Hill (1997), which is incorporated herein by reference.

[0018] In the illustrated embodiment, the portable cell phone 120 is a digital cell phone capable of receiving both voice and text messaging. In an alternative embodiment, the portable cell

phone 120 may also be capable of using a headset attachment to allow hands-free operation. The portable cell phone 120 may also attach to a belt clip for storage or for use in conjunction with a headset attachment. In addition, the portable cell phone 120 may also allow hands-free operation while stored in a cradle. The cradle may be a conventional cradle, which is constructed to hold or store the portable cell phone 120.

[0019] The antenna 125 is a conventional portable cell phone antenna that provides communications between the portable cell phone 120 and the communications tower 110. Through the antenna 125, the portable cell phone 120 sends and receives voice or data communications across the cellular telephone network 100 via the communications tower 110.

[0020] In the illustrated embodiment, the power circuit 130 may be a typical power circuit in the portable cell phone 120 that produces a transmit power level equivalent to, for instance, a maximum transmit power level of one watt. Through communications with the communications tower 110 employing the antenna 125, the power circuit 130 may also provide a network adjusted transmit power level that is lower than the maximum transmit power level of one watt. The network adjusted transmit power level is based on a transmit signal strength of a communications path between the communications tower 110 and the portable cell phone 120.

[0021] In an advantageous embodiment of the present invention, the power circuit 130 is further coupled to the proximity regulation system 140 that determines a proximity transmit power level of the portable cell phone 120 based on its location proximate the portable cell phone user 150. Though not illustrated in FIGURE 1, the proximity regulation system 140 includes a location sensing subsystem and a power governing subsystem, which cooperate to determine both the proximity transmit power level and when it may be employed. Both the location sensing subsystem and the power governing subsystem are more fully discussed with respect to FIGURE 2.

[0022] The proximity regulation system 140 in the illustrated embodiment, is a dedicated device that is constructed of special-purpose hardware employing a software program, which directs its operation. In an alternative embodiment, the proximity regulation system 140 may be integrated into a power algorithm employing software that controls the power circuit 130. The proximity regulation system 140 may be installed when the portable cell phone 120 is constructed. Alternatively, the proximity regulation system 140 may be an after market addition to the already constructed portable cell phone 120. In one embodiment, the proximity regulation system 140 may be installed with a switch that allows the portable cell phone user 150 to disengage the proximity

regulation system 140. In another embodiment, the proximity regulation system 140 may be used with a personal digital assistant or any other portable device that may emit radio frequency energy within the vicinity of a user.

[0023] The portable cell phone user 150 is typically anyone who uses a portable cell phone. This, of course, includes children through senior adults. In the illustrated embodiment, the portable cell phone user 150 is using the portable cell phone 120 proximate their head. Alternatively, the portable cell phone user 150 may use the portable cell phone 120 while attached to a belt clip or in conjunction with a headset. In another embodiment, the portable cell phone user 150 may use the portable cell phone 120 for data text messaging. In this case, the portable cell phone 120 may be typically located in front of the portable cell phone user 150 and within a distance of an arm's length. It is also contemplated that the portable cell phone 120 may transmit and receive other forms of multimedia communications such as video.

[0024] Turning now to FIGURE 2, illustrated is a block diagram of an embodiment of a portable cell phone, generally designated 200, employing a proximity regulation system 210 constructed in accordance with the principles of the present invention. The portable cell phone 200 includes the proximity regulation system 210, a power circuit 240, a headset operation mode input 250, a

belt clip sensor 260 and a data transfer operation mode circuit 270. The portable cell phone 200 is attached to a belt clip 280 having a position indicator 290. The proximity regulation system 210 includes a location sensing subsystem 220 and a power governing subsystem 230.

[0025] The proximity regulation system 210 determines a proximity transmit power level of the portable cell phone 200 based on the location of the portable cell phone 200 proximate a portable cell phone user. In the illustrated embodiment, the proximity regulation system 210 is a dedicated device that is solely hardwired. As discussed above with respect to FIGURE 1, the proximity regulation system 210 is coupled to the power circuit 240. Additionally, the proximity regulation system 210 is coupled to the headset operation mode input 250, the belt clip sensor 260 and the data transfer operation mode circuit 270. Of course, a portable cell phone may still employ the proximity regulation system 210 without the headset operation mode input 250, the belt clip sensor 260 or the data transfer operation mode circuit 270.

[0026] The location sensing subsystem 220 is coupled to the power governing subsystem 230, and determines a location of the portable cell phone 200 proximate a user. In the illustrated embodiment, the location sensing subsystem 220 is embodied in an integrated circuit. In another embodiment, the location sensing

subsystem 220 may be embodied as a sequence of operating instructions.

[0027] In an exemplary embodiment, the location sensing subsystem 220 determines that the portable cell phone 200 is proximate the head of the user if there is no indication that the portable cell phone 200 is in a data transfer operation mode, a headset operation mode or located on a belt clip. In another embodiment, the location sensing subsystem 220 may determine if the portable cell phone 200 is proximate the head of the user through a designated sensor 225 located on the portable cell phone 200.

[0028] The designated sensor 225 may be an inductively coupled loop that changes a surrounding magnetic field when in the vicinity of the user's head. The change in the magnetic field creates a change in the inductive coupling thereby causing an impedance change associated with the inductively coupled loop. The impedance change may affect the current flow in the inductively coupled loop, which can be used to indicate the proximity of the portable cell phone 200 to the user's head.

[0029] In an alternative embodiment, the designated sensor 225 may also be a contact sensor that indicates proximity of the portable cell phone 200 to the user's head when the portable cell phone 200 is touching the user's ear. The contact sensor may also indicate proximity of the portable cell phone 200 to the user by

contact from the user's hand. One skilled in the pertinent art will understand that other sensors may be used to indicate the proximity of the portable cell phone 200 to the user's body.

[0030] In an alternative embodiment, the location sensing subsystem 220 determines that the portable cell phone 200 is proximate the body of the user when receiving an indication from the data transfer operation mode circuit 270. Additionally, the location sensing subsystem 220 may determine that the portable cell phone 200 is proximate the body of the user if the portable cell phone 200 is located on the belt clip 280 or a headset is inserted in the headset operation mode input 250. Still, another embodiment may indicate that the portable cell phone 200 is away from the body of the user when the portable cell phone 200 is in a cradle.

[0031] The power governing subsystem 230 is coupled to the location sensing subsystem 220. The power governing subsystem 230 determines the proximity transmit power level of the portable cell phone 200 based on the location of the portable cell phone 200 as determined by the location sensing subsystem 220. In one embodiment, the network adjusted transmit power level may be reduced to a value determined by the proximity transmit power level when the location of the portable cell phone 200 is within the vicinity of the user's head. In another embodiment, the network adjusted transmit power level may be similarly reduced when the

location of the portable cell phone 200 is just within the vicinity of a user's body.

[0032] In another embodiment, the proximity transmit power level may match the network adjusted transmit power level, which may be the maximum transmit power level of, for instance, one watt, when the portable cell phone 200 is operating in the headset operation mode or the data transfer mode. In still another embodiment, the proximity transmit power level may be further reduced when the portable cell phone user is a child. A switch 235 may be installed on the portable cell phone 200 to allow this user option. Additionally, the switch 235 may also allow the user to disengage the proximity regulation system 210 whenever desired. In one embodiment, the switch 235 may be a standard software switch that the user controls through a display and a keypad of the portable cell phone 200.

[0033] The headset operation mode input 250 is a conventional receptacle for receiving a headset that allows hands-free operation. As mentioned above, the headset operation mode input 250 is coupled to the proximity regulation system 210. The location sensing subsystem 220 of the proximity regulation system 210 receives an indication that the headset is in use from the headset operation mode input 250 when a headset is inserted. In one embodiment, the location sensing subsystem 220 determines that

the portable cell phone 200 is not within the vicinity of the head of the user upon receiving indication from the headset operation mode input 250.

[0034] In another embodiment, the location sensing subsystem 220 may determine that the portable cell phone 200 is within the vicinity of the user's body if the headset is inserted in the headset operation mode input 250. In an alternative embodiment, the location sensing subsystem 220 may determine that the headset operation mode input 250 may be used in conjunction with the belt clip sensor 260 to indicate that the portable cell phone 200 is proximate the user's body.

[0035] The belt clip sensor 260 is coupled to the proximity regulation system 210 and indicates when the portable cell phone 200 is located within the belt clip 280. The belt clip sensor 260 may be a contact sensor that is depressed by a protrusion on the belt clip 280 when placed in the belt clip 280. In an alternative embodiment, the belt clip sensor 260 may use an inductively coupled loop constructed to indicate to the location sensing subsystem 220 that the portable cell phone 200 is in the belt clip 280.

[0036] The data transfer operation mode circuit 270 is coupled to the proximity regulation system 210 and indicates to the location sensing subsystem 220 of the proximity regulation system 210 when the portable cell phone 200 is being used for data text

messaging. As mentioned above with respect to the discussion of the antenna 125 of FIGURE 1, the data text messaging may be received from a communications network via an antenna such as those shown in FIGURE 1.

[0037] The belt clip 280 is a conventional device for holding the portable cell phone 200. The belt clip 280 is typically constructed of plastic and constructed to attach to a user's belt. The belt clip 280 may hold the portable cell phone 200 when the user is not using the portable cell phone 200. In alternative embodiments, the belt clip 280 may hold the portable cell phone 200 when the headset is being employed. In other embodiments, another type of clip may be used by the user to hold the portable cell phone 200. For example, instead of the belt clip 280, the user may store the portable cell phone 200 in a clip that attaches to a shirt pocket or an arm band.

[0038] The position indicator 290 of the belt clip 280 may be a protrusion that depresses the belt clip sensor 260 on the portable cell phone 200 to indicate to the location sensing subsystem 220 that the portable cell phone 200 is positioned in the belt clip 280. In an alternative embodiment, the position indicator 290 may be a metallic insert that varies the magnetic field of an inductively coupled loop of the belt clip sensor 260. It should be noted that other pertinent components not shown may be included

within the portable cell phone 200 without departing from the scope of the present invention.

[0039] Turning now to FIGURE 3, illustrated is a flow diagram of an embodiment of a method, generally designated 300, of operating a portable cell phone constructed in accordance with the principles of the present invention. The method 300 starts in a step 305 with an intent to operate a portable cell phone.

[0040] Following the step 305, the portable cell phone determines its location proximate a user in a step 310. In one embodiment, the location may be determined by a designated sensor that indicates the proximity of the portable cell phone to a user's head. In alternative embodiments, the location may be determined by other sensors including a belt clip sensor, a cradle sensor, or a headset sensor.

[0041] After determining proximity to the user, the portable cell phone provides a control signal in a step 320. The control signal may, for instance, be either a voltage level or current level that is designated to correspond to the previously determined location. Those skilled in the pertinent art will understand the use of control signals to represent a determined condition.

[0042] After providing a control signal, the portable cell phone determines if the control signal indicates proximity of the portable cell phone to the user in a first decisional step 330. In

one embodiment, various control signals may be designated to correspond to different locations of the portable cell phone proximate the portable cell phone user. For example, one control signal may represent that the portable cell phone is in the vicinity of the user's head. Another control signal may be used to represent that the portable cell phone is in the vicinity of the user's body. In alternative embodiments, the control signal may represent that the portable cell phone is not within the vicinity of the user's body.

[0043] In the illustrated embodiment, if it is determined that the portable cell phone is proximate the user, then the transmit power level is reduced as determined by a value of a proximity transmit power level, in a step 340. In one embodiment, the transmit power level may be reduced to one network adjusted transmit power level whenever the portable cell phone is within the vicinity of any part of the user's body. In another embodiment, the transmit power level may be reduced to various allowable proximity transmit power levels depending on the vicinity of the portable cell phone to different parts of the user's body.

[0044] After adjusting the transmit power level, the portable cell phone then transmits at a reduced level in a step 350. In one embodiment, the adjusted transmit power level may not exceed the network adjusted transmit power level as determined by the

communications path between the portable cell phone and the communications tower. In other embodiments, the adjusted transmit power level may be reduced to the proximity transmit power level. Finally, the transmission of the portable cell phone ends in a step 370.

[0045] Returning now to the first decisional step 330, if the portable cell phone is not proximate the user, then the method 300 proceeds to a step 360 wherein the portable cell phone transmits at the network adjusted transmit power level. In one embodiment, the network adjusted transmit power level may equal the maximum transmit power level of a portable cell phone. In other embodiments, the network adjusted transmit power level may be a reduction from the maximum transmit power level due to the communications path between the communications tower and the portable cell phone. After transmitting in step 370, the method 300 ends in the previously mentioned step 360.

[0046] Although the present invention has been described in detail, those skilled in the art should understand that they can make various changes, substitutions and alterations herein without departing from the spirit and scope of the invention in its broadest form.

WHAT IS CLAIMED IS:

1. For use with a portable cell phone, a proximity regulation system, comprising:

a location sensing subsystem configured to determine a location of said portable cell phone proximate a user; and

a power governing subsystem, coupled to said location sensing subsystem, configured to determine a proximity transmit power level of said portable cell phone based on said location.

2. The proximity regulation system as recited in Claim 1 wherein said proximity transmit power level is reduced when said location is within a vicinity of a user's head.

3. The proximity regulation system as recited in Claim 1 wherein said proximity transmit power level is limited to a predetermined maximum level.

4. The proximity regulation system as recited in Claim 1 wherein said proximity transmit power level is maximum when said portable cell phone is operating in a headset operation mode or data transfer operation mode.

5. The proximity regulation system as recited in Claim 1 wherein said portable cell phone is located on a belt-clip of said user.

6. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem or said power governing subsystem is embodied in an integrated circuit.

7. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem or said power governing subsystem is embodied in a sequence of operating instructions.

8. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem determines said location by employing a sensor selected from the group consisting of:

a designated sensor,

a contact sensor,

a belt clip sensor, and

a cradle sensor.

9. The proximity regulation system as recited in Claim 1 wherein said location sensing subsystem determines said location by ascertaining a mode of operation of said portable cell phone.

10. A method of operating a portable cell phone, comprising:

determining a location of said portable cell phone proximate a user;

providing a control signal based on said location; and

determining a proximity transmit power level of said portable cell phone based on said control signal.

11. The method as recited in Claim 10 wherein said proximity transmit power level is reduced when said location is within a vicinity of a user's head.

12. The method as recited in Claim 10 wherein said proximity transmit power level is limited to a predetermined maximum level.

13. The method as recited in Claim 10 wherein said proximity transmit power level is maximum when said portable cell phone is operating in a headset operation mode or data transfer operation mode.

14. The method as recited in Claim 10 wherein said portable cell phone is located on a belt-clip of said user.

15. The method as recited in Claim 10 wherein said determining said location is performed by a location sensing subsystem embodied in an integrated circuit.

16. The method as recited in Claim 10 wherein said determining a proximity transmit power level is performed by a power governing subsystem embodied in a sequence of operating instructions.

17. The method as recited in Claim 10 wherein said determining a location employs a sensor selected from the group consisting of:

a designated sensor,

a contact sensor,

a belt clip sensor, and

a cradle sensor.

18. The method as recited in Claim 10 wherein said determining a location is performed by ascertaining a mode of operation of said portable cell phone.

19. A portable cell phone, comprising:

a power circuit that provides a network adjusted transmit power level as a function of a position to a communications tower; and

a proximity regulation system, including:

a location sensing subsystem that determines a location of said portable cell phone proximate a user; and

a power governing subsystem, coupled to said location sensing subsystem, that determines a proximity transmit power level of said portable cell phone based on said location.

20. The portable cell phone as recited in Claim 19 wherein said proximity transmit power level is reduced when said location is within a vicinity of a user's head.

21. The portable cell phone as recited in Claim 19 wherein said proximity transmit power level is limited to a predetermined maximum level.

22. The portable cell phone as recited in Claim 19 wherein said proximity transmit power level is maximum when said portable cell phone is operating in a headset operation mode or data transfer operation mode.

23. The portable cell phone as recited in Claim 19 wherein said portable cell phone is located on a belt-clip of said user.

24. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem or said power governing subsystem is embodied in an integrated circuit.

25. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem or said power governing subsystem is embodied in a sequence of operating instructions.

26. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem determines said location by employing a sensor selected from the group consisting of:

a designated sensor,

a contact sensor,

a belt clip sensor, and

a cradle sensor.

27. The portable cell phone as recited in Claim 19 wherein said location sensing subsystem determines said location by ascertaining a mode of operation of said portable cell phone.

A PROXIMITY REGULATION SYSTEM FOR USE WITH A PORTABLE CELL PHONE AND A METHOD OF OPERATION THEREOF

ABSTRACT OF THE DISCLOSURE

A proximity regulation system for use with a portable cell phone and a method of operating the same. In one embodiment, the proximity regulation system includes a location sensing subsystem that is configured to determine a location of the portable cell phone proximate a user. A power governing subsystem is coupled to the location sensing subsystem and configured to determine a proximity transmit power level of the portable cell phone based on the location.

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Bib Data Sheet

CONFIRMATION NO. 4925

SERIAL NUMBER	FILING DATE	CLASS	GROUP ART UNIT	ATTORNEY DOCKET NO.
09/967,140	09/28/2001 RULE	455	2681	R.L. MCDOWELL 20-76

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Philip D. Mooney, Sellersville, PA;

** CONTINUING DATA ********** None TV

** FOREIGN APPLICATIONS ********** None TV

IF REQUIRED, FOREIGN FILING LICENSE GRANTED
** 10/26/2001

		STATE OR COUNTRY	SHEETS DRAWING	TOTAL CLAIMS	INDEPENDENT CLAIMS
Foreign Priority claimed ☐ yes ☑ no 35 USC 119 (a-d) conditions met ☐ yes ☑ no ☐ Met after Allowance Verified and Acknowledged Examiner's Signature Initials TV.		PA	3	27	3

ADDRESS
27964

TITLE
Proximity regulation system for use with a portable cell phone and a method of operation thereof

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PATENT APPLICATION SERIAL NO. _____

U.S. DEPARTMENT OF COMMERCE
PATENT AND TRADEMARK OFFICE
FEE RECORD SHEET

10/03/2001 SFELEKE1 00000021 501735 09967140

01 FC:101 710.00 CH
02 FC:103 126.00 CH

PTO-1556
(5/87)

*U.S. GPO: 2000-468-987/39595

PATENT APPLICATION FEE DETERMINATION RECORD
Effective October 1, 2000

Application or Docket Number: R.L. McDOWELL-2078

CLAIMS AS FILED - PART I

	(Column 1)	(Column 2)
TOTAL CLAIMS	27	
FOR	NUMBER FILED	NUMBER EXTRA
TOTAL CHARGEABLE CLAIMS	27 minus 20=	* 7
INDEPENDENT CLAIMS	3 minus 3 =	* 0
MULTIPLE DEPENDENT CLAIM PRESENT		☐

* If the difference in column 1 is less than zero, enter "0" in column 2

SMALL ENTITY TYPE ☐		OR	OTHER THAN SMALL ENTITY	
RATE	FEE		RATE	FEE
BASIC FEE	355.00	OR	BASIC FEE	710.00
X$ 9=		OR	X$18=	126
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL		OR	TOTAL	836

CLAIMS AS AMENDED - PART II

AMENDMENT A

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

SMALL ENTITY		OR	OTHER THAN SMALL ENTITY	
RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT B

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

AMENDMENT C

	(Column 1) CLAIMS REMAINING AFTER AMENDMENT		(Column 2) HIGHEST NUMBER PREVIOUSLY PAID FOR	(Column 3) PRESENT EXTRA
Total	*	Minus	**	=
Independent	*	Minus	***	=
FIRST PRESENTATION OF MULTIPLE DEPENDENT CLAIM				☐

RATE	ADDITIONAL FEE		RATE	ADDITIONAL FEE
X$ 9=		OR	X$18=	
X40=		OR	X80=	
+135=		OR	+270=	
TOTAL ADDIT. FEE		OR	TOTAL ADDIT. FEE	

* If the entry in column 1 is less than the entry in column 2, write "0" in column 3.
** If the "Highest Number Previously Paid For" IN THIS SPACE is less than 20, enter "20."
***If the "Highest Number Previously Paid For" IN THIS SPACE is less than 3, enter "3."
The "Highest Number Previously Paid For" (Total or Independent) is the highest number found in the appropriate box in column 1.

FORM PTO-875
(Rev. 8/00)

Patent and Trademark Office, U.S. DEPARTMENT OF COMMERCE
*U.S. GPO: 2000-460-706/30103

CLAIMS ONLY

SERIAL NO. 09967140 | FILING DATE

APPLICANT(S)

CLAIMS

	AS FILED		AFTER 1st AMENDMENT		AFTER 2nd AMENDMENT			*		*		*	
	IND.	DEP.	IND.	DEP.	IND.	DEP.		IND.	DEP.	IND.	DEP.	IND.	DEP.
1	1						51						
2		1					52						
3		1					53						
4		1					54						
5		1					55						
6		1					56						
7		1					57						
8		1					58						
9		1					59						
10	1						60						
11		1					61						
12		1					62						
13		1					63						
14		1					64						
15		1					65						
16		1					66						
17		1					67						
18		1					68						
19	1						69						
20		1					70						
21		1					71						
22		1					72						
23		1					73						
24		1					74						
25		1					75						
26		1					76						
27		1					77						
28							78						
29							79						
30							80						
31							81						
32							82						
33							83						
34							84						
35							85						
36							86						
37							87						
38							88						
39							89						
40							90						
41							91						
42							92						
43							93						
44							94						
45							95						
46							96						
47							97						
48							98						
49							99						
50							100						
TOTAL IND.	3	⬇		⬇		⬇	TOTAL IND.		⬇		⬇		⬇
TOTAL DEP.	24						TOTAL DEP.						
TOTAL CLAIMS	27						TOTAL CLAIMS						

* *MAY BE USED FOR ADDITIONAL CLAIMS OR ADMENDMENTS*

FORM PTO-2022 (1-98)

U.S.DEPARTMENT OF COMMERCE
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