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(54) **COMPUTERISED SYSTEM FOR ORDERING TAXI SERVICES AND FOR MONITORING THE OPERATION OF A TAXICAB**

(57) The invention relates to computerised control systems using communications means, in particular to taxi service providers. The inventive system receives information on a taxicab location in a computer central office (1) and records said information in a computer memory (3). When the order of a taxi client is received, the location thereof is defined and a direct voice communication is established between the client and a taxi driver. The computer central office (1) comprises a base radio station (13), a computer (3) consisting of modems (4), an answering machine (5), an automatic caller identification display (6), an electronic telephone dialer (7), an audio signal recording device (8) and a switching device (14). The communication module (2) of a taxicab consists of a mobile radio station (15) connected to a microcomputer (16) by means of a modem (18), wherein said microcomputer is provided with a display (17) and a traveled distance sensor (19) connected thereto.

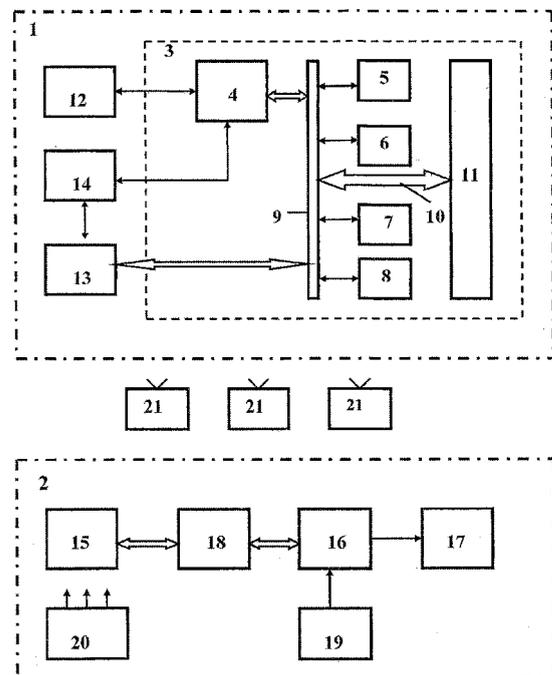


Fig. 1

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Description

[0001] The invention relates to the computerized control systems using the communication facilities.

Existent art.

[0002] The modern organizational management of control centers providing taxi services is carried out in the following way. The operators of the control centers accept taxi service orders over the telephone communication channels. In order to search a free taxi and to transmit the booking-on there are used radio stations with allocated radio-frequency channel. In some cities for talks of the operators of the control centers with the driver there are used mobile phones of the GSM system, and for taxicab localization is used the GPS system. The description of taxi service rendering work of the control centers is set out in many scientific and training editions [1], [2].

[0003] It is known a patent for a system for communication with a mobile object wherein for taxi localization is used the GPS satellite communications system [3].

[0004] In the patent [4] it is disclosed a process for taxi client connection with the taxi-cab wherein the taxi client applies to the central office, receives the information about the free taxi and comes in contact with it over the mobile communication.

[0005] It is also known a patent for a taxi public conveyance control system. In the given system for taxi localization it is used the GPS satellite communications system, taxi accounting is carried out in the computer of the control center. On entry of taxi order the operator types the order information from the keyboard in the computer which gives out the information about several taxicabs, ready to accept the order, the operator chooses one of the variants, communicates with the driver over the radio station and transmits the booking-on to him. If by chance the taxicabs are busy, the operator repeatedly applies for the information to the computer. Upon order transmission to the taxi driver the operator contacts with the taxi client and communicates the number of the taxi and the arrival time [5].

[0006] The existent system possesses different disadvantages. It is impossible for the drivers of the taxicabs to perfectly keep in mind the names of all streets and alleys, diagrams of intraestate passages of the settlement. Considerable time is spent for utilization of the geographical map and diagrams. The communication of information through the operator of the control center leads frequently to cases of information distortion and taxicab drive to an unconditioned place which leads to breakdown of orders or repeated additional talks between the operator, driver and client which degrades the quality of the provided services. Provision of the control center's work needs a considerable increase in the number of qualified personnel. It should be mentioned the influence of the existent system on the traffic safety since, realizing

the conveyance according to the accepted order, the driver has to turn on the speakerphone of the radio transmitter for information listening with the view of obtaining a new booking-on, that distracts his attention from driving and jams other audible warning signals. Moreover, the speakerphone in the passenger compartment degrades the passenger service quality. Application of the headphones and microphone does not improve the situation.

10 Disclosure of the invention.

[0007] The problem, the given invention solves, consists in the creation of a technological process for computerized taxi service order booking and exclusion from the participation in the process of the controller, reduction of call procedure time, of the computerized taxicab location recording and of the carried volume of work, improvement of drivers' conditions of work. The undertaken problem is solved by the process wherein the computer receives and saves messages of the taxicab drivers about their location and readiness to accept the order for taxi services, in the following message there are automatically transmitted data on the carried volume of work, stored in the microcomputer of the taxicab. On entry of the call signal over the communications channel from the client of taxi services the computer establishes the communication with the nearest taxicab and commutates the communication channels of the taxi client and of the taxicab driver. The immediate vocal information exchange between the driver and the client reduces the time for order acceptance and transmission, excludes the possibility of information distortion.

[0008] For solution of the undertaken problem into the device, comprising base and mobile radio stations, are introduced a computer, including devices of the call signal reception unit, of the automatic number finder, of the automatic answer-back unit, of the electronic dialer, and of audio signal recording. The communication module of the taxicab comprises a minicomputer, onto the display of which there is printed the electronic map with the visually emphasized location of the client, for illustrating the driver the precise place of taxicab driving during the voice information exchange with the taxi client. At the time of passenger service the minicomputer switches over to the taximeter mode in order to determine the conveyance payment sum. Moreover, in the minicomputer database there is contained the supplemental information necessary for qualitative passenger service (addresses of the organizations, enterprises, medical institutions, public transport schedules). Application of the GSM system mobile phone permits the driver to accept the order outside the taxi compartment which considerably improves his conditions of work. Record in the computer memory of voice talks between the taxi client and the taxicab driver during order transmission will permit to establish the truth in case of appearance of conflicting situations. In the present invention the client is given the right of taxicab selection according to different parameters: according to

the taxicab class, according to the driver's language knowledge and other parameters - by pressing the corresponding number of the telephone set.

Brief description of drawings.

[0009] Summary of the invention is explained by drawings. On Fig. 1 it is represented the block diagram of the system, comprising a device of the computer center 1 and a communication module 2 of the taxicab. On Fig. 2 it is represented the software algorithm block diagram, illustrating the system activity.

Detailed description of invention.

[0010] On Fig. 1 it is represented the device and the interaction of the constituent elements of the computer center 1 and the communication module 2 of the taxicab.

[0011] The device of the computer center 1 consists of a computer 3, including the following devices: a modem 4, an automatic answer-back unit 5, an automatic number finder 6, an electronic dialer 7, an audio signal recording device 8, connected to an interface 9 and through a pathway 10 to a processor 11. To the input of the modem 4 there is connected a telephone circuit 12, to the subscriber number of which there enter the calls of the telephone network subscriber who wish to take advantage of the taxi services. The modem 4 serves as a call signal reception unit, establishes the connection with the telephone network subscriber and starts the control program of the computer 3, as well as relays the audio signal into the telephone circuit 12 from the external sources and backwards. To the telephone circuit 12 by means of the control program it is connected the automatic answer-back unit 5. On establishment of the connection with the telephone network subscriber by means of the program there are switched in the functions of the automatic number finder device 6. That service is rendered by the operator of the telephone network, the so-called "Caller-ID" or "Clip" service. To the input of the computer 3 port there is connected a base radio station 13, in the capacity of which there may be used a mobile phone of the GSM system. The base radio station 13 serves for radiocommunication with the mobile subscriber. For automatic number dialing there serves the electronic number dialer 7. In the mobile phones of the GSM system the function of number dialing is performed by the device of the operator's base station. For electric audio signal transmission and interfacing between the base radio station 13 and the telephone circuit 12, with the view of providing the voice communication of the taxi client with the taxi driver, there serves the commutation device 14, to the inputs-outputs of which there are connected the inputs-outputs of the audio signals of the modem 4 and the base radio station 13. It is possible the audio signal transmission between the communication lines by means of the control program of the computer 3. The audio signal recording device 8 is used for recording the vocal talks of

the taxi client with the taxicab driver.

[0012] The communication module 2 of the taxicab consists of a mobile radio station 15, in the capacity of which is used a mobile phone of the GSM system or a radio station with embedded microprocessor and numeric keyboard, a minicomputer 16, equipped with a liquid-crystal display 17 and a button keyboard equivalent. In the database of the minicomputer 16 there is contained a program of the electronic served region map, which on reception of the text message with the subscriber telephone number of the taxi service client relays on the display and visually emphasizes on the screen the client's site and the shortest movement route. The program of the electronic map possesses the function of changing the scale from the plan within the limits of the city up to the plan of separate entrance into the building with the intrastate passages, names of the streets and building numbering. The minicomputer 16 is equipped with control programs of the mode of information transmission to the computer center 1, mode of operation as a taximeter, mode of reception of the supplemental information necessary for service rendering to passengers. The mobile radio station 15 is connected through a modem 18 to the computer 16 by means of a cable with contact header. To the input of the minicomputer 16 it is connected a pulse covered distance sensor 19, starting the control program of the minicomputer 16 into the taximeter mode and serving as a taxi covered distance meter. During the public conveyance on the CRT screen there is printed the distance covered by the taxicab, the movement and down time, the service cost. The power supply unit 20 provides for the power supply of all devices of the communication module 2. The retransmitters 21 serve for stable radiocommunication on the served territory.

[0013] The device functions in the following way. The taxi driver who wishes to accept the order for taxi services transmits to the computer center 1 a text message containing the taxicab site code. The variants of all type messages are stored in the database of the minicomputer 16 or in the memory of the mobile radio station 15. The base radio station 13 receives the message, reads the subscriber number of the mobile radio station 11 and relays them in the computer 3 at the command of the control program. The control program of the computer 3 enters the site code in the database, in the table of general line of the order waiting taxicabs and then forms a response message containing the serial number of the message with the analogous site code and the number of messages with other taxicab site codes. The driver analyses the message and on his own decision may transmit a message with other site code with the view of receiving the order at the earliest possible time. For cancellation of the message concerning his readiness to accept the conveyance order the taxicab driver transmits a text message with the cancellation code. In that case the computer 3 excludes it from the table of the database.

[0014] The device operation mode on entry of the call from the taxi service client is carried out in the following

way. The client dials the subscriber number of the telephone circuit 12 of the computer center 1, the call signal through the modem 4 is received by the computer 3, there starts the control program at the command of which it is established the connection with the client "the receiver raises", it is defined the subscriber number of the client's telephone, in the telephone circuit 12 it is connected the automatic answer-back unit 5, which relays the voice information, proposing the client to choose the taxicab parameter by pressing the corresponding number of the telephone set, it is read the incoming digital signal, afterwards according to the subscriber telephone number of the taxi client in the look-up table of the database it is defined the site code of the taxi client, according to the site code of the taxi client and the code of the chosen taxicab parameter it is read the subscriber number of the taxicab waiting for order from the corresponding table. The taxicab parameter code in the table is assigned by the program automatically with the subscriber number. Then the read subscriber number of the taxicab is relayed in the electronic dialer 7, carrying out the number dialing. After call booking by the mobile radio station 15 it is established the connection between the base radio station 13 and the mobile 15 one, it is carried out transmission of the voice signals between the communication lines of the taxi client and the base radio station 13 through the commutation linkage 14. The control program connects the recording device 8 through the modem 4 from the telephone circuit 12 and memorizes them in the computer 3.

[0015] After entry of the on-hook signal from the communication channel, the control program of the computer 3 returns to the starting position, to the call signal waiting mode.

[0016] The operation of the computer center 1 is carried out in a multichannel mode in the local computer network. Reception of mobile subscribers' messages is produced at an individual radio station, connected to the computer in the computer network. As individual communication channel, receiving the taxi clients' calls, there may be used a mobile phone of the GSM system.

[0017] The information, incoming in the computer 3, is stored in the database and is used for accounting and controlling the work of the taxicabs.

[0018] On Fig. 2 it is represented the block diagram of the algorithm, illustrating the functions performed by the computer system.

[0019] At step 21 there starts the process for accounting of taxicabs intending to accept the order with the message entry signal from the mobile radio station 15. At step 23 it is read the message text code and the subscriber number of the mobile radio station 15, at step 24 it is taken a decision, whether the code is a code of taxicab exclusion from the table of order waiting taxicabs, at step 25 the record is deleted from the table, the process is terminated, backspacing, if the message contains the taxi site code the process switches to step 26, wherein it is taken the decision if the subscriber number of the mobile

radio station 15 is missing in the database of the computer 3, at step 27 there is produced the message dumping, backspacing if the subscriber number is present in the database, the program switches to step 28, it is carried out recording in the database table of the subscriber number of the mobile radio station 15, of the location code and it is forms a response text message for the subscriber of the mobile radio station, containing the taxicab location codes and the number of messages with such codes that means the number of order waiting taxicabs, at step 30 there is transmitted the message; then program backspacing.

[0020] Another control program performs the reception of the taxi clients calls and establishes the connection with the subscriber of the mobile radio station 11.

[0021] The process begins at step 31. The taxi client's call signal incoming over the communication line starts the control program, at the command of which it is established the connection with the taxi client. At step 32 to the communication line it is connected the automatic answer-back unit 5, at step 33 it is read the taxicab parameter code, absence of the parameter is further ignored. At step 34 it is read the telephone number of the taxi client, at step 35 it is taken the decision, if the telephone number is defined, the program switches to step 36 and takes a decision, when the telephone number is present in the look-up table of the database, it is carried out switch to step 37, it is read the taxi client site code and switch to step 38, if the subscriber number of the client is not defined, or the client site code is missing in the database, the program switches to step 39, it independently assigns the site code and switches to step 38, where it is taken the decision on the basis of obtained client site codes and the taxicab parameter code chosen by him. If in the database, in the table of order waiting taxicabs, the subscriber number of the mobile radio station 15, with the corresponding codes, is not found it is realized the switch to step 40, change of the site code, return to step 38. At step 41 it is read the subscriber number of the mobile radio station 15, then at step 42 it is transmitted a message containing the telephone number of the taxi client, which from the mobile radio station 15 is relayed in the minicomputer 16 and it is started the program of the electronic map. At step 43 it is established the connection with the mobile radio station 15. At step 44 there are commuted the audio signal lines of the communication line 12 of the taxi client and of the base radio station 13. At step 45 it is connected the audio signal recording device 8 from the communication line 12. At step 45 the on-hook signal in the communication line interrupts the operation of the program and backspaces it to the call signal waiting mode.

[0022] The software and hardware environment are obvious to a person skilled in the art and it is not required a more detailed description thereof.

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Claims

1. Process for a computerized system for ordering taxi services and for monitoring the work of a taxicab, including the process of radiocommunication between the base and mobile radio stations, **characterized in that** it is carried out transmission from the communication module of the taxicab to the computer of the central station of a text message on the readiness of accepting the order for taxi services, containing the taxicab site code, concomitantly it is identified the subscriber number of the mobile phone and are recorded in the computer memory, according to the call signal coming from the client of taxi services from the communication line, connected to the computer, it is read the subscriber number of the client's telephone, it is determined his site code in the computer database look-up table, it is carried out search of the match of data on client location with the taxicab location in the computer database table, 40

it is read out the subscriber number of the taxicab's telephone, it is formed the call signal, after reception of the call signal and establishment of radiocommunication between the base radio station and the mobile subscriber there are sent the voice communications between the communication line of the taxi service client and the base radio station.

2. Process, according to claim 1, **characterized in that** in the process for establishing the connection with the client into the communication line there is connected an automatic answer-back unit, there are sent information messages and there are received response code taxicab parameter signals, in the process of establishing the connection with the mobile subscriber it is transmitted the client site code, it is visually represented his location on the display of the taxicab communication module, it is connected the voice message recording means after commutation of communication lines of the client and of the base radio station. 5
3. Process, according to claim 1, **characterized in that** in the process of taxicab work it is carried out storage of data on the covered distance and on the obtained income into the memory of the taxicab's minicomputer, which during the transmission of the order waiting signal are automatically transmitted to the memory of the base computer, where they are program-processed and visually used. 10
4. Process, according to claim 1, **characterized in that** for cancellation of the signal concerning the readiness of accepting the order for taxi services there is sent a code message from the communication module of the taxicab to the computer center. 15
5. Device of a computerized system for ordering taxi services and monitoring the work of a taxicab, containing a base radio station connected by a radio channel to the mobile radio station of the taxicab, **characterized in that** the computer center comprises a computer, including a modem, performing the function of call signal reception from the external devices, an automatic telephone network subscriber number defining device, an automatic answer-back unit, an audio signal recording device, a number dialer, the inputs-outputs of which are connected to the computer interface, a commutation device, the inputs-outputs of which are connected to the inputs-outputs of the audio signals of the base radio station and of the modem, to the input of the modem there is connected the communication line of the taxi client, as mobile radio station it is used a mobile phone with individual number. 20
6. Device, according to claim 5, **characterized in that** into the communication module of the taxicab there 25

are introduced a microcomputer with display, through the modem of which there is connected a mobile phone, a covered distance sensor, the output of which is connected to the input of the microcomputer, a power supply unit.

Amended claims under Art. 19.1 PCT

1. Process for a computerized system for ordering taxi services and for monitoring the operation of a taxicab, including the process of client's radiocommunication with the taxicab, **characterized in that** for receiving and executing the order for taxi services there are transmitted from the communication modules of the taxicabs to the computer of the central station SMS-messages, containing the preferable district code, each of which with the corresponding subscriber number of the taxicab's GSM telephone is registered in the accounting means of the computer, according to the call signal, coming from the client of taxi services to the receiving means of the computer, it is established the connection with the client, it is determined the subscriber number of his telephone and it is carried out search of his site code in the telephone set subscribers data accounting means, then it is carried out search of the identical district code in the taxicab SMS-message accounting means, it is read out the subscriber number of the taxicab's GSM telephone, the first having sent the SMS-message with the sought for district code, it is formed a taxi calling signal, after receiving the call signal and establishing the radiocommunication between the GSM telephones of the central station and of the taxicab there are sent voice messages between the client of taxi services and the GSM telephone of the taxicab.

2. Process, according to claim 1, **characterized in that** from the computer of the central station to the taxi's GSM telephone there is sent an SMS-message, containing the ordinal number of its queue for the execution of taxi services order and other district codes of the region with the number of SMS-messages incoming from the taxicabs, and for cancellation or substitution of the SMS-message incoming to the central station together with the district code it is sent from the taxicab an SMS-message containing the cancellation code or the code of another district.

3. Process, according to claims 1-2, **characterized in that** after establishing the contact of the client of taxi services with the central station to the communication line there is connected an automatic answer-back unit and there are sent information messages, and after establishing the contact with the taxicab there is transmitted the subscriber number

of the client's telephone, it is represented its position onto the plan of the served region on the taxicab computer display and it is connected the voice message recording means.

4. Process, according to claim 3, **characterized in that** the client of taxi services performs the selection of the taxicab according to the parameters of the information message and sends reply signals.

5. Process, according to claims 1-4, **characterized in that** in the taxicab's computer memory it is carried out accumulation of the taxicab total, operating and empty run data, which concomitantly with the transmission of SMS-messages from the communication module of the taxicab, are sent to the computer of the central station and are program-processed together with the data on SMS-messages and calls of the clients of taxi services for accounting and monitoring the work of the taxicabs.

6. Process, according to claims 1-5, **characterized in that** between the client of taxi services and the central station it is used a wire telephone communication containing "m" channels.

7. Process, according to claims 1-5, **characterized in that** the call signals of the client of taxi services are received to "n" GSM telephones.

8. Process, according to claims 6-7, **characterized in that** there are used "m" channels of the wire telephone communication in common with "n" GSM telephones.

9. Process, according to claims 1-8, **characterized in that** it is determined the subscriber number of the client's telephone, it is sent to the communication module of the taxicab an SMS-message, containing the mentioned number, it is established the connection from the communication module of the taxicab with the client of taxi services, it is accepted the order for taxi services.

10. Device of the computerized system for ordering taxi services and for monitoring the work of a taxicab, containing communication means of the client of taxi services, of the central station and of the taxicab, **characterized in that** the device of the central station contains a computer, including a means for accounting of telephone numbers of the telephone set subscribers with their site codes, a means for accounting of subscriber numbers of the taxicabs GSM telephones with the possibility of user's prohibition to receive SMS-messages therefrom, a means for reception, read-out, recording and storage of SMS-messages and of subscriber numbers of the taxicabs GSM telephones, having sent them, a taxi's GSM

telephone call means, connected to the interface of the computer, a call signal reception means with a communication means of the client of taxi services and an automatic number finding means, connected thereto, the inputs-outputs of which are connected to the communication means of the client of taxi services, and as means for communication of the central station with the taxicab there is used a GSM telephone, connected to the computer, the inputs-outputs of the audio signals of which are connected through the signal transmission means to the communication means of the client of taxi services, and as means for communication of the taxicab with the central station it is used a GSM telephone.

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11. Device, according to claim 10, **characterized in that** to the computer of the central station there are connected an automatic answer-back unit and an audio signal recording means, the inputs-outputs of which are connected to the communication means of the client of taxi services, and into the communication module of the taxicab there are introduced a computer with display, to the input of which there are connected a covered distance sensor, a taxi compartment charge sensor and a swapping means for GSM telephone connection.

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12. Device, according to claim 10, **characterized in that** as communication means of the client of taxi services it is used a wire telephone communication containing "m" channels.

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13. Device, according to claim 12, **characterized in that** as means for taxi service client call signals reception there are used "n" GSM telephone.

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14. Device, according to claims 12-13, **characterized in that** the device contains "m" channels of the wire telephone communication and "n" GSM telephones.

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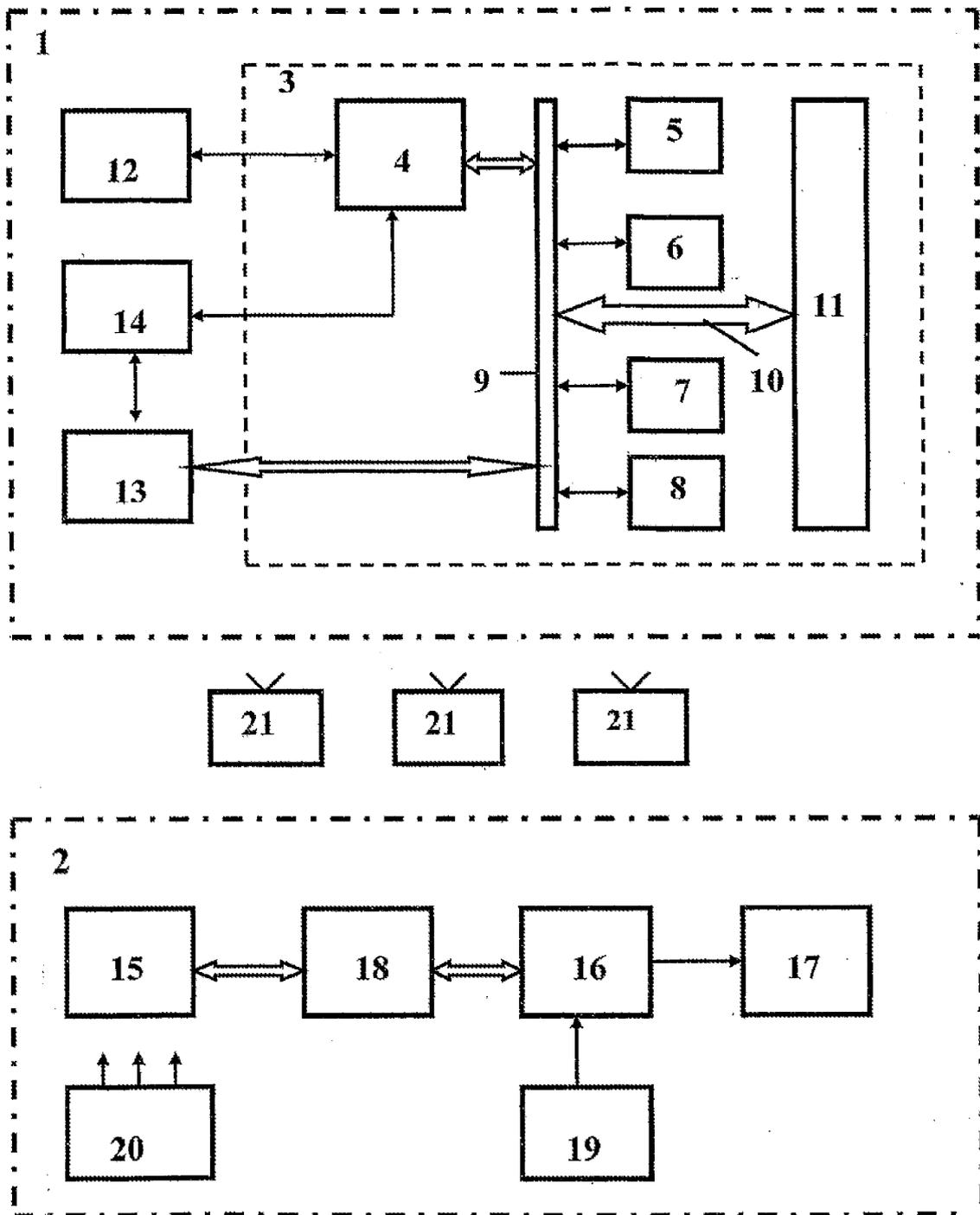


Fig. 1

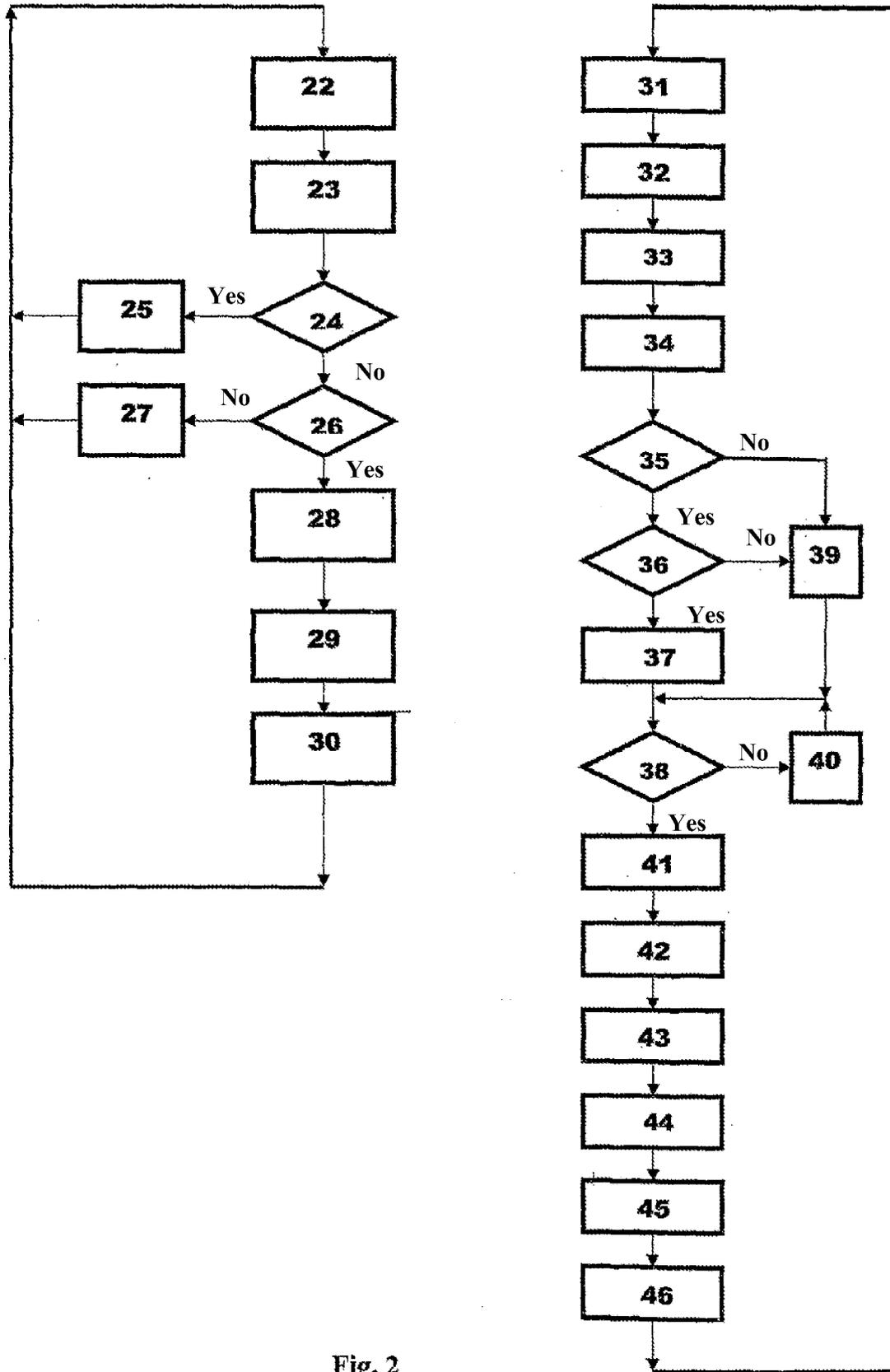


Fig. 2

INTERNATIONAL SEARCH REPORT

International application No.

PCT/MD 2005/000029

A. CLASSIFICATION OF SUBJECT MATTER		G07C 5/00 (2006.01)i G08G 1/01 (2006.01)i
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) G07C 5/00, 5/02, G07B 13/00, 13/08, G08B 25/00, 25/08, 25/10, G08G 1/01, 1/00, 1/123, H04M 3/00, 11/00, 15/00, H04B 7/00, 7/24, 7/26		
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 practicable, 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 A	SU 926708 A (PROIZVODSTVENNO-TEKHNICHESKOE OBEDINENIE "AVTOTRANSTEKHNIKA" MINISTERSTVA AVTOMOBILNOGO TRANSPORTA BELORUSSKOI SSR) 07.05.1982 column 6, lines 10-45, column 1, lines 12-24, column 2, lines 1-4	5-6 1-4
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10 October 2005 (10.10.2005)	10 November 2005 (10.11.2005)	
Name and mailing address of the ISA/	Authorized officer	
Facsimile No.	Telephone No.	

Form PCT/ISA/210 (second sheet) (July 1998)

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International application No.

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