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(54) **IMPROVED DIGITAL SYSTEM FOR RECORDING AND REPRODUCING RADIOPHONIC ADVERTISEMENTS.**

(57) The improved digital system for recording and reproducing advertisements is a system which makes possible the recording and reproduction of radiophonic advertisements in real time directly from a data processing medium, obtaining a high sound quality without deterioration of such quality after many reproductions due to the type of format of sound data, and also allowing to send the advertisements between remote locations through normal telephone lines without losing the good quality, independently of the distance, and also making possible that a same system performs the emission of the advertisements and uses the resulting parameters for its own use in the corresponding administrative part, without having to interrupt the process for human intervention reasons, thereby avoiding possible errors.

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AIM OF THE INVENTION

The present invention refers to system for recording and reproduction of radio broadcasting wedges based on digital technology and projected and designed with a view to achieving a significant advance in the field of digital treatment of the recording of radio broadcasting wedges, though this specific aim did not turn out to be the most significant improvement of those obtained in the systems of use; in actual fact, the most important improvement was that which will be set out below in the development of this request, and which will allow the following: administrative control of transmission of the wedges, transmission of sound messages between broadcasting stations and studios, even by means of low quality telephone lines, and a simplified selection by technicians of the wedges to be transmitted, as well as automatic programming of transmissions in blocks, thus reducing possible errors, in addition to other advantages, which, as a whole, represent the basic set of achievements motivating this request.

BACKGROUND OF THE INVENTION

Up till now, the systems used for recording and reproduction of advertising wedges may be considered to form part of standard systems of sound treatment, no specific applications being dedicated to this subject.

In order to give a clearer explanation of the previous state of art, we will give a brief historical summary.

During the first years of radio, advertising messages were sent out directly. At a later stage, physical media of the advertising wedges were used, the same as those employed for any sound recording, at the beginning the old wire magnetophones, later to be replaced by magnetic tape recorders. At this stage, each of the advertising wedges was kept in a small magnetic tape medium, and storing of these media required a lot of space. In addition to this, and in order to ensure a quick transmission of several wedges one after the other, several magnetophones were needed, while manual work had to be done very swiftly in order to obtain an adequate chaining of the different wedges.

When open-coil magnetic tapes were introduced on the market in new formats, such as the "cassette" tape which, at the beginning, had a significant impact on the European market, and the cartridge tape known as "four-track cartridge", with a parallel influence on the American market, in the radio branch, the choice fell on the latter type, due to a specific adaptation for the use of radio broadcasting stations and the reproduction and recording of advertising wedges. This system makes it possible to use a magnetic tape open coil, cutting off the part corresponding to the duration of the wedge and, by means of a simple operation, installing it in the plastic container which, thanks to its configuration, allows this piece of tape, played always in the direction of the reproduction reading, to be what we understand by "endless"; in other words, having united its beginning and end, the tape constantly keeps turning. A system of tones in a specific frequency enables the reading device to detect the end of the recording and the beginning of it and, as a result, the chaining which proved so difficult in previous processes now was significantly simplified.

DESCRIPTION OF THE INVENTION

THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF RADIO WEDGES is a system that makes it possible to obtain the reproduction of advertising wedges thousands of times without causing any deterioration whatsoever of the quality of the sound as a consequence of use while, moreover, this system establishes a two-way relation between, on the one hand, the transmission and treatment of the wedges and, on the other, departments such as accounting or advertising within the transmission station or chain, thus allowing the follow-up, the establishing of timetables or the modification of blocks by the said stations, thanks to this direct computer communication system which, in addition, makes it possible for them, when they wish, to carry out the chainings between transmitted wedges in the same block in a completely accurate and automatic way, thus significantly reducing the space needed to contain them. We will now proceed with a more detailed explanation of the above, starting with advertising wedges.

A wedge is produced by digital process, that is, converting the sound signal that proceeds from a microphone or any other type of conventional medium into information capable of being recorded on a computer medium. By this process, we can carry out any kind of computer treatments that can be carried out with any type of information. The result is also that reproduction remains unalterable, in spite of the passage of time, through backup copies, etc.

Once the wedge has been recorded, it is given a name and a code as file within the system. Thanks to this and to the simplicity of treatment of any file, the different departments of programming, accounting, advertising, etc. are able to process the information immediately as regards the treatment they need to give to these files. Thus, by simply pushing a button, the controller of the transmission

can transmit a block of wedges which he himself does not even know and which has been set up a minute ago by the programming or advertising departments. Furthermore, within the operating system of a broadcasting station, no physical displacement will be necessary anymore to change listings of blocks in the studio, to collect those of the previous day or to introduce a modification as the transmission is taking place, etc. Neither will the technicians responsable for the transmission of the wedges have to be on the watch for the exact transmission time of a block, etc.

The ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF RADIO BROADCASTING WEDGES contains two basic concepts which must be explained here. The first concept is that of the conversion of wedges into files and their treatment. In other words, these files can be recorded with the parameters one wishes to apply; the originals received at broadcasting stations from sound studios can be sent in this type of medium instead of the conventional ones, provided always that the studio has a similar system; the wedges can be transmitted over conventional telephone lines without even the slightest loss of quality, as the transmission is a digital data transmission and, in short, all advantages resulting from the treatment of the sound data.

The other treatment consists of chaining, transmission relations, programming, invoicing, insertions and other processes that can be carried out with these files. This involves a very significant simplification of the task of the broadcasting station's departments and avoids many of the mistakes susceptible of occurring when using conventional systems.

We must point out the importance of the advance of this system avoiding transmission of data between the sections integrating the mechanical part of a radio broadcasting system, such as the administrative and the technical sections. This system has achieved the integration of the two sections in one and the same, since the computer system is the same one. Thus, verification of any wedge can be carried out not only in the studio, but also in any of the terminals, depending exclusively on the availability of the appropriate accesses.

As for the practical operation of the transmission of wedges, these can be selected one by one, while the cutoff between wedges will not be noticed; blocks can be established in advance and it is even possible to introduce minisyntonies between them, apart from other possibilities. These processes can be established in advance and by an automatic procedure, in accordance with one's wishes.

The wedges are recorded on a computer medium which can be either centralized, with accesses of each terminal of the system, or independent per studios or control stations, meaning that, for example, the medium containing the programme of the day is passed on to independent media for each of the studios. These independent units would have been recorded in advance.

The studio technician selects the code of the wedge to be transmitted, for example "2F" or the title of the wedge, which he finds on the listing he can obtain on the "help" screen. Next, he pushes the reproduction button. The wedge is then reproduced. If, while the wedge is being transmitted, he selects a new wedge and enters the order of transmission of this new wedge, the latter will be chained to the previous one as soon as it ends. Here we have seen an operating mode in which the technician of each studio selects the wedges to be transmitted. Another execution formula is the one where the programming department has established the transmission order and programmed it in advance in the system. This way, the system indicates to the technician the approximate time when a particular block must be transmitted, by means of a light signal or an instruction on the "help" screen, indicating that the block must be transmitted. So the technician, at the time he considers convenient, depending on the development of the programme, simply has to give the order of reproduction of the block, which will be reproduced accordingly. He does not need to know the composition of the block itself nor of the wedges contained in it. At the same time, the programme will register the parameters corresponding to the administrative departments which, accordingly, will obtain transmission reports, transmission hours, etc., based on data which are completely real and accurate, thus avoiding all possible errors often occurring in this field till now.

Furthermore, the system proves to be equally operative in the opposite sense. In other words, wedges can be automatically programmed if one wishes, without anyone having to intervene. When the wedge is received at the broadcasting station, it is introduced into the system with its corresponding parameters, such as transmission days, approximate hours of transmission, number of times, etc. Depending on the number of wedges to be transmitted and other factors, as well as codes to avoid putting two similar customers together, etc, each day the system automatically selects each block and chain, so that the controller only will have to indicate the exact time when the transmission of a block must start, once the system has told him that it is time to start.

This system, based on the description given above, also avoids that wedges are repeated by mistake, that their transmission is forgotten or that their hardware is lost, in addition to other factors that guarantee a high level of reliability.

DESRIPTION OF THE GRAPHICS

In order to complete the description and in order to provide a better understanding of the features of the invention we annexe to the present description a sort of graphics in which the following has been represented with illustrative and not with a limitative character:

Figure 1.-It shows a diagram of blocks controling individually several broadcasting stations without permanent link.

Figure 2.- It also shows a diagram of blocks controlling simultaneously several broadcasting stations without permanent link.

Figure 3.- It shows a different way of control of the previous figure.

Figure 4.- It shows a new way of executing the same type of control.

Figures 5, 6, 7 and 8.- They show several models of links between studios.

Figure 9.- It shows, according to a diagram of blocks, the system of automatic independent sincronization for a local broadcasting station.

Figure 10.- It shows the diagram of blocks of the installation scheme.

Figure 11.- It shows a different way to execute the signaling system of figure 9.

Figure 12.- It shows the system of data and commands control with mixed communication.

Figure 13.- Finally, it shows a system for complete programming of groups of broadcasting stations with links by means of microphonic lines from a central station.

PREFERABLE EXECUTION OF THE INVENTION

As we have said previously, figure 1 shows a diagram of blocks corresponding to the control of several broadcasting stations without permanent link and in an individual way. The main broadcasting station has been referred to as (1) and the secondary broadcasting stations with (2, 2', 2''). The main broadcasting station (1) counts with a central organizer (3), a interface (4) for telephone communication, a terminal of control (5), administration, etc. and a modem (6), such main broadcasting station transmitting, through telephone centrals of the Spanish Telephone Company, the information to the secondary broadcasting stations (2), each of them provided with a telephone interface (8), a daniel 2 (9), a control (10) and a terminal (11).

When the permanent link is done simultaneously with the main broadcasting station (1) a interface of lines (12) comes into action, as shown in figure 2, of the modem (6) of such broadcasting station is divided into additional modems (6', 6''), corresponding to the secondary broadcasting stations, as shown in figure 3, or according to figure 4, you can transmit, by means of a different telephone central (7'), from the main broadcasting station (1) to another secondary broadcasting station (2'), and using another central (7'') to the third secondary broadcasting station and so on.

With regard to the type of studio connection and according to figures 5 to 8, we start from a unit R/G (13) related to the central organizer (3) through the connection (14) that allows the flow in both senses of control and sound data, such unit (13) also receiving information from a re-recordable laser disk (15), such unit (13) being asociated to a control unit (16), a studio console (17) and a commanded CD (18), with any of the type of connection displayed in figures 5 to 7 or with the participation of an end pass automatic mixer (19), as in figure 8, studio console (17) assisted by the clasical peripherals (20) such as magnetophones, record player and microphones, a central of lines (21) connected to it. In figures 5 to 8 the output of the programme has been numbered (22).

Accurately, connection of figure 5 without automatic switching, connection of figure 6 with automatic switching, connection of figure 7 with automatic switching and direct output and connection of figure 8 with automatic switching and end pass automatic mixer. Figures 9 and 11 display two examples of practical execution of the system of independent automatic sincronization, a central organizer (23) taking part in all of them, assitied by a programming console (24). A transmission of sound and control data is made from the central organizer (23) to a RG studio (25) assisted by a mixer console (26), thus in the first case the transmission output is established from the studio it self (25), while in the second case such output is established from the console (26), in any case accessing the broadcasting station (27).

In the installation scheme of figure 10, the central control unit has been numbered (28), associated to it there is a telephone interface (29) for advertising reception, another telephone interface (30) for control and a satellite interface (31), togehter with a printer (32), a block for programmes control (33), a block for backup copies (34) and several RG units (35) each of them assisted by a laser disk (36) and a commanded compact disk (37). Figure 12 displays a command data control system with mixed communication, in which a central broadcasting station has been numbered (38) and a local broadcasting station (39). The central broadcasting station counts with a central programme organizer (49), chain commands and management, assisted by three consoles, a consoles cointaning commands from the central control (41), a programming console and a administration console (43). Such central organizer (40) counts with a interface

(44) that receives control data from the local station (39), with a converter of modulated signal that acts on a interface (46) encoder mixer of signals to a broadcasting station (47) via satellite, the interface (46) also receives commands from a console (48) of central control for the outputting of the programme to the satellite. On the other side, each local broadcasting station counts with a receiver (49), an interface (59) of signal encoder and separator, a demodulator (51) of commands signals, a Daniel 2 central unit (52) a modem (53) to send data to the central broadcasting station, a mixer console (54) and a RG unit (55). In figure 12 continous lines represent commands or orders sent together with the chain sound in a part of the band, this allows the simultaneous execution of all broadcasting stations and several processes at distance. Discontinous lines correspond to verification signals and other management and control data that the central station can ask for to any of the broadcasting stations in an automatic way by means of a telephone call or a certain line designed for this purpose.

Finally, figure 13 displays the complete programming system of groups of broadcasting stations with a microphonic line connection from a central. Main broadcasting stations has been numbered (56) and secondary station (57), continous lines refer to sound and date and discontinous lines refer to data exclusively. In dis figure the central organizer is numbered (58), the communication interface (59), the bidirectional convertor of commands of modulated signal (60), the RG unit is numbered (61), the broadcasting station for control and transmission (62), the peripherals previously mentioned 63) and frequency splitter encoder-decoder corresponding to the main broadcasting station, the frequency splitter encoder-decoder corresponding to the secondary broadcasting station (57) has been numbered (65), being assisted by a bidirectional convertor of modilated signal command (66), a console (68) to control the transmission with its correspondent peripherals (69) and a Daniel 2 organizer (70).

For a better understanding, we will now look at a sequence in which the advertising wedge is recorded at a sound production studio and subsequently sent from this studio to several radio broadcasting stations at a distance of hundreds of kilometers. We now select one of these stations to explain an automatic execution process. The wedge will be programmed for a period of two months.

At the recording studio, the speakers are ready. The technician has decided to carry out the recording directly on the digital medium through the system; he could also have registered it first on a conventional medium to transfer it at a later stage.

He prepares the system, using his "help" screen, selecting the medium on which he wants to record the wedge, the quality he wants to obtain, etc, until the system indicates that it is ready and waiting only for the relevant button to be pushed and thus start recording.

The technicians now pushes the button and plays a disk. The speakers enter reading their texts, and all this is recorded on a hard disk incorporated in the system, after having been converted into a digital format. At the end, the technician indicates to the system that the recording is finished.

Once this stage is finished, and using the digital sound information, the system allows the technician to eliminate silences or small background noises, to speed up or to increase the duration of the recording, to select the names and codes he will give to the file, to work with the file adding other files to it, etc.

Once the adjustments of the final result are finished, in case such adjustments were made, the technician must send the wedge to several broadcasting stations. To do so, he simply dials the telephone number of the stations and gives the system the order to transmit the wedge in digital form. At this moment, the transmission will be carried out by communication between modems and will send both the sound file and the programming of it, in addition to other information.

Once the file is received at one of the broadcasting stations, the station proceeds to check and verify the perfect sound of the file sent, as well as the data corresponding to its programming. If all is correct and the approval of the advertising and programming departments is obtained, the latter may give the order to the system to proceed with the transmission of the wedge just as it was received and, therefore, just as it was programmed.

From this moment, and taking into consideration that we selected an automatic operating mode, the wedge received in the way set out above will appear in each block corresponding to the hours and days for which it has been programmed. If, for example, this programming is established for each Monday, Wednesday and Friday at 10 am and 8 pm, the system, by means of its internal calendar, will automatically select this wedge in these blocks.

For a period of two months, every Monday, Wednesday and Friday, at the control which at each given time is being transmitted within the radio broadcasting station, at 10 am and at 8 pm, apart from many other occasions when this will logically happen, a light signal will be seen or an instruction will appear on the "help" screen, indicating that, from that moment on, the technician

must give way to a block of wedges. The technician, who does not even have to know which wedges will be transmitted, gives way to these wedges, which are then transmitted.

At the same time, in a file of the system will be recorded the code, the name and the exact transmission hour of the wedge, indicating also whether the transmission took place without any anomaly. Each day, the advertising department will receive a list which will contain these data and which will serve as an accurate instrument of control. Also, at the end of each month, invoicing will be done automatically, indicating to the customer the exact hours of transmission, etc. Consequently, we will, to all purposes, have the certainty of a correct programming since, if there hade been any defaults in any of the transmissions, the system would have detected them and subsequently would have repeated the transmission and indicating the default either in accordance with the programming or with the actual transmission.

Claims

1. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized by the fact that such recording and reproduction of advertising wedges is made on computer media in a direct way and in a pure digital form, thus achieving recording and reproduction of the wedges on standard computer media in real time and offering a pure sound, manageable by computer means, while allowing long-distance transmission of the wedges by telephone lines, without loss of quality due to the digital nature, moreover the same process integrates the management of information regarding the said wedges for its use in administrative processes and in the sound execution of them.

2. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized in accordance with the first claim by the fact that it allows recording advertising wedges on digital files contained in computer media and, from these media, specific and differentiated treatments, such as the treatment to avoid errors or maladjustments between the wedge transmission control and the actual transmission of the wedges, the same system carrying out both processes.

3. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized by the fact that it allows automatic programming and transmission of wedges and the setting-up of different blocks of wedges to be transmitted at each moment in an automatic way and till the very end of the process, that is to say, the actual transmission of the wedges, all of this being carried out within the same system, while both sound data and information regarding the wedges can be found in the same computer file.

4. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized in accordance with the previous claims by the fact that the computer file that bears the wedge, also bears the date including transmission time and the means that will indicate the moment when the transmission must be carried out.

5. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized in accordance with the previous claims by the fact that, it allows the design of formulas for the transmission of wedges which, subsequently, will be composed automatically by the system, such as syntonies between wedges, pauses between wedges or broadcasting syntonies at the beginning and at the end of a transmission, in addition to similar versions.

6. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized in accordance with the previous claims by the fact that it integrates in one and the same system the processes of invoicing, programming and transmission of wedges of a radio broadcast station, none of this information having to be handled in any of their intermediate steps through the intervention of technicians, not even when selecting the wedges or during the sound execution of the wedges themselves.

7. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVERTISING WEDGES is characterized in accordance with the previous claims by the fact that it allows direct programming by telephone of the transmission of one or several advertising wedges to the execution itself from any recording studio, without need for anybody at the broadcasting station to intervene in the process, except for purposes of optional supervision.

8. THE ADVANCED DIGITAL SYSTEM FOR RECORDING AND REPRODUCTION OF ADVER-

TISING WEDGES is characterized in accordance with the previous claims by the fact that it allows reproduction in real time of a wedge from a single computer file. This wedge does not suffer any deterioration regardless of the number of times it is reproduced.

INTERNATIONAL SEARCH REPORT

International Application No PCT/ES 92/00028

I. CLASSIFICATION OF SUBJECT MATTER (if several classification symbols apply, indicate all) [6]

According to International Patent Classification (IPC) or to both National Classification and IPC

Int.Cl.[5] H 04 H 1/00 H 04 H 7/00 H 04 M 11/06
G 09 F 25/00

II. FIELDS SEARCHED

Minimum Documentation Searched [7]

Classification System	Classification Symbols
Int.Cl.[5]	H 04 H H 04 M G 09 F

Documentation Searched other than Minimum Documentation to the Extent that such Documents are Included in the Fields Searched [8]

III. DOCUMENTS CONSIDERED TO BE RELEVANT [9]

Category *	Citation of Document, [11] with indication, where appropriate, of the relevant passages [12]	Relevant to Claim No. [13]
X,P	EP, A, 0443933 (ARCOMIS) 28 August 1991 see the whole document	1,3,4,10
X	FR, A, 2624294 (GILLOTIN et al.) 9 June 1989, see page 1, line 1 - page 2, line 9; page 3, lines 16-39	1
A		2
X	EP, A, 0355697 (HITACHI LTD)28 February 1990, see page 3, line 19 - page 4, line 47	1
A	US, A, 4720873 (GOODMAN et al.) 19 January 1988, see column 1, line 5 - column 4, line 31	1,2
X		3,4,10
A	EP, A, 0337539 (TELEMA S.r.l.) 18 October 1989, see claims	1

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* Special categories of cited documents: [10]

"A" document defining the general state of the art which is not considered to be of particular relevance

"E" earlier document but published on or after the international filing date

"L" document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)

"O" document referring to an oral disclosure, use, exhibition or other means

"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

"X" document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step

"Y" document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.

"&" document member of the same patent family

IV. CERTIFICATION

Date of the Actual Completion of the International Search	Date of Mailing of this International Search Report
7 July 1992 (07.07.92)	25 August 1992 (25.08.92)
International Searching Authority	**Signature of Authorized Officer**
European Patent Office	