



US00RE39470E

(19) **United States**
(12) **Reissued Patent**
Hylin et al.

(10) **Patent Number:** **US RE39,470 E**
(45) **Date of Reissued Patent:** **Jan. 16, 2007**

- (54) **DIGITAL INFORMATION SYSTEM**
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- (21) Appl. No.: **09/821,969**
- (22) Filed: **Mar. 30, 2001**

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- (22) Filed: **Mar. 30, 2001**
- Related U.S. Patent Documents**
- Reissue of:
- (64) Patent No.: **6,005,534**
- Issued: **Dec. 21, 1999**
- Appl. No.: **08/676,517**
- Filed: **Jul. 2, 1996**

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- U.S. Applications:
- (60) Provisional application No. 60/017,403, filed on May 14, 1996.
- (30) **Foreign Application Priority Data**
- Apr. 26, 1996 (SE) 9601603-5

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- (51) **Int. Cl.**
- G09F 27/00** (2006.01)
- G09F 19/18** (2006.01)
- G09F 15/00** (2006.01)
- G09F 19/12** (2006.01)
- G06F 13/04** (2006.01)

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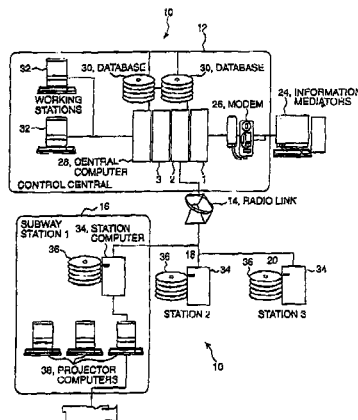
- (52) **U.S. Cl.** **345/2.1; 345/2.2; 705/5; 705/6**
- (58) **Field of Classification Search** **345/1.1, 345/1.2, 2.1, 2.2, 3.1, 7; 705/5, 6; 349/5-7**
See application file for complete search history.

ABSTRACT

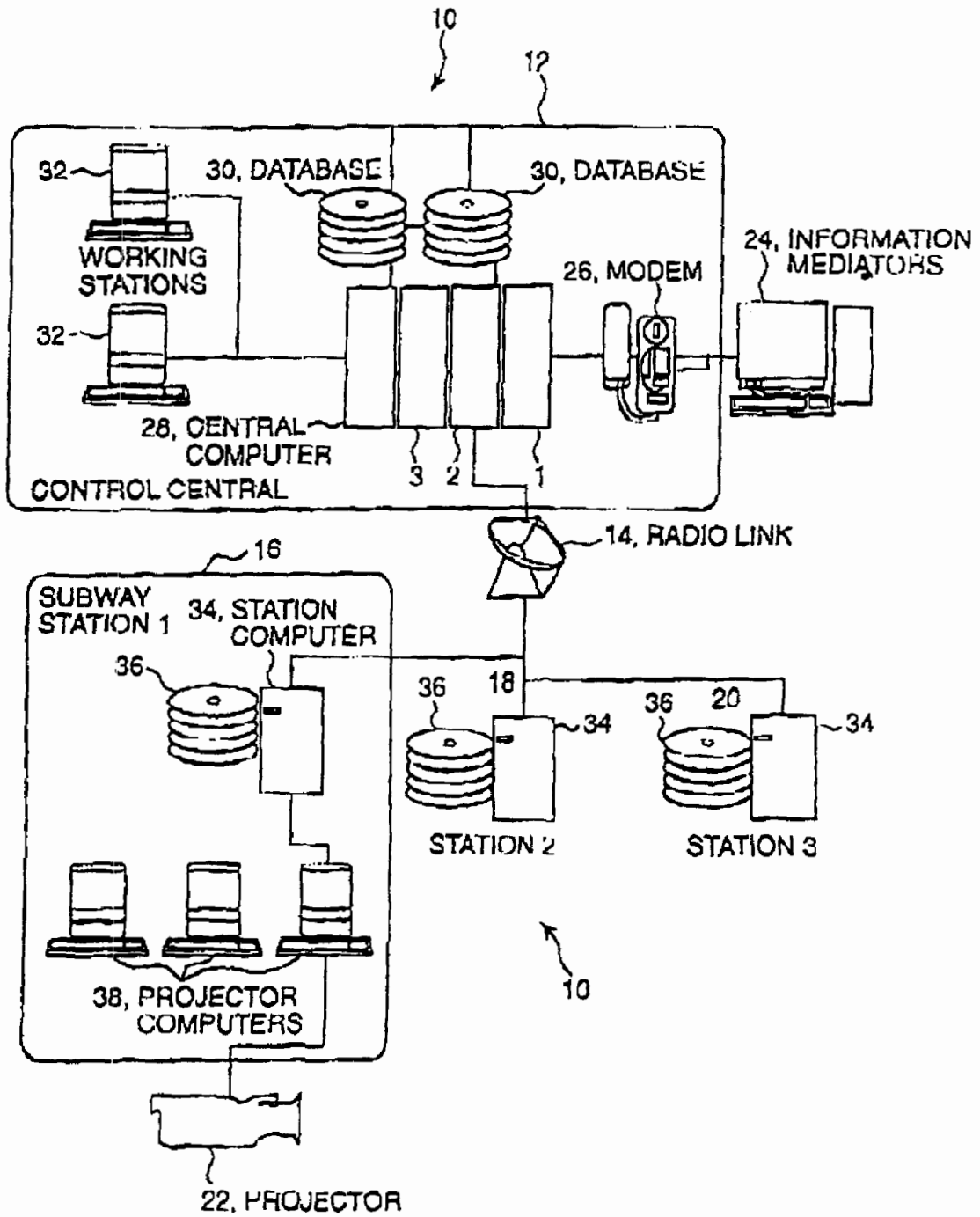
The invention relates to a digital information system (10) for displaying information on at least one display means with the aid of at least one projector (22). The exposures are presented at places accessible to and frequented by a general public. The information system (10) includes external information mediators (24) and information is controlled dynamically through the medium of a communication interface (26) and through the medium of an exposure handler in a central computer (28). The inventive system also include a communication interface (14) against an elective number of station computers (34) having connected projector computers (38) which control projectors (22) for displaying pictures or exposures. The station computers (34) and peripheral equipment are situated at mutually distanced places. According to one particular field of use, the places mentioned are subway stations (16, 18, 20) and projectors (22) project exposures or pictures onto display means positioned at selected places in the stations (16, 18, 20).

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26 Claims, 1 Drawing Sheet



IPR2016-01869 Ex. 1001



DIGITAL INFORMATION SYSTEM

Matter enclosed in heavy brackets [] appears in the original patent but forms no part of this reissue specification; matter printed in italics indicates the additions made by reissue.

RELATED APPLICATION

This application claims priority to the provisional U.S. patent application No. 60/017,403 entitled "Communication System", filed May 14, 1996.

TECHNICAL FIELD

The present invention relates to a method and [to] apparatus for controlling and coordinating projectors in a digital information system for displaying information on at least one display device through the medium of at least one projector for each said device, said information being displayed in places that are accessible to and frequented by a general public. In one particular aspect, the invention is applied to control projectors for displaying information directed towards people in such places as main railway stations, subway stations, airport waiting lounges, etc.

DESCRIPTION OF THE BACKGROUND ART

Systems that are used to show information in the form of advertisements, timetable messages or arrival and departure times in present-day public service infrastructures with regard to buses, trains, subway traffic, etc., [is] are of a static nature. Such information is given on notice boards, posters, charts, tables, verbally through loudspeakers, and on digital displays, etc. A characteristic feature of such information media is that the information media is not coordinated, but is in the form of individual items which are controlled and updated separately, often manually.

[Modem] Modern digital displays used, e.g., in conjunction with subway railway traffic [gives] give some of the aforesaid information but [is] are not controlled to display advertisements, warning messages, etc. Furthermore, the information is often supplemented with verbal messages transmitted from traffic control centres. The information channel cannot be subscribed to directly for the display of external information suppliers, such as advertising bureaux, the authorities, newspapers, etc., but is processed administratively and fed manually into the information display systems.

Although the administration of information is often processed manually with the aid of modern computer technology, the available display time will nevertheless contain "dead time", among other things due to backlogging caused by the manual infeed process.

Thus, present-day systems do not enable information to be updated dynamically for display in real time. Neither do present-day systems enable external mediators to update information for display in a central control system, nor yet the administrator who makes the display of information available, but [that] it is the administrator who determines when, where and how the information shall be displayed.

The present-day static information display systems are therefore beset with a number of problems.

Also known to the art are systems for displaying or showing picture series in local public places, such as assembly halls, lecture halls, and conference rooms in industry.

attractive manner, often with rapid picture changes and overlaps, so as to avoid the risk of boring viewers, as with conventional display with diapositive projectors. The computer control of such systems may well be both complicated and advanced. Unfortunately, these systems are nevertheless static insofar as they are used in one and the same locality and controlled and managed on the display site. The display must be planned carefully beforehand, this planning often being carried out by experts within the technical field in question, so as to obtain a finished display product. For instance, when a company wishes to change its display and introduce a new picture series combined with sound, the process again becomes static by virtue of the need to employ experts to program and arrange the new display.

The same problem as that mentioned above is also met when showing pictures through diapositive projectors in one and the same locality, because the display subscriber has very little chance of influencing the display, especially in real time. The picture display is directed towards a limited public and towards scheduled display of one and the same information material to the public concerned. The picture display is not directed to a large number of people, as in the case of a railway station platform, a subway platform or in airports. In places of this nature, it should be possible to spread the information and to display different information in different places within said stations and it should be possible to update and change the information quickly. When the information displayed on said station is not effectively coordinated, the displays on which information is presented will often become static, for instance show the time of the next display or show a pause picture, i.g. dead time. This becomes nerve-wracking to travellers, who often wait for long periods in waiting halls or stand on platforms. Neither is the failure to utilize expensive information display equipment to the highest possible degree compatible with good economy.

SUMMARY OF THE INVENTION

An object of the present invention is to provide a flexible system in which external information mediators are able to dynamically control in real time the transmission of display instructions to a larger public in different places situated at any chosen distance apart through projectors which project information onto displays intended [herefor] therefor.

Another object of the invention is to enable pictures, images, messages and announcements to be configured in accordance with modern digital technology, therewith providing rapid communication.

A further object of the invention is to enable a picture, image or other information to be changed in practice as often as is desired, in real time, therewith providing direct and immediate communication, and to enable similar or specific information to be displayed in places that are mutually far apart and to enable message information to be alternated with advertising spots, for instance.

According to one aspect, the present invention relates to a method of coordinating and controlling projectors in a digital information system for displaying information on at least one display device through the medium of at least one projector for each such display device, said information being displayed in places that are generally available to and frequented by a general public.

Information display subscribers are connected to a computerized control centre via computer and telecommunica-

tion interface [against] *with* computerized devices situated in connection with said places for projector coordination and control.

The control centre is able to create and update a display list in real time with control instruction fields via booking information for display dynamically in time from mediators having drive routine means which are connected to the subscription and which are transparent for the transmission of information to the drive routine means of the control centre for transmission of information in the system.

The display list, which includes control instructions, coordinates and controls the projectors concerned with regard to what shall be displayed, when it shall be displayed, where it shall be displayed and for how long it shall be displayed, and causes each projector, independently of other projectors, to receive the same or different information for display through respective projectors and through the computerized devices, in accordance with the display list.

The administrator of the digital information system is able to update the display list with desired information at any time whatsoever, wherein the dynamic booking can be changed or delayed.

The projector may also interrupt display of information when the allocated display devices, or the projector, is/are visually obstructed in said public place. The projector lens can then be covered with a protective device when a dirty atmosphere is detected or anticipated and which is [imminently] *imminently* likely to dirty the lens.

In one embodiment, the [projectors] *projector* is provided with a projector computer which controls and delivers exposures to the projectors controlled by a server included in the computerized device, wherein the projector computer has a buffer memory which is filled with subsequent exposures as the exposure to be displayed at that moment via the projector is emptied from the buffer memory.

Alternatively, a server included in said computerized device is provided with a projector computer which controls and feeds exposures to the projectors, wherein the projector computer is connected to a buffer memory which is filled with subsequent exposures as the exposure current at that particular moment is displayed through the projector and emptied from the buffer memory.

A server situated in a specific place and included in a computerized device further includes databases, and information in the databases concerning exposures in the exposure list is copied in databases of servers in a selected number of computerized devices situated in other places.

In one embodiment, the exposure list may include reserved instruction fields for updating with control instructions via the mediator interface, wherein the control instructions can be placed in a waiting line, or queue, when the exposure list lacks instruction updating fields at that moment in time.

In another embodiment of the invention, a switch detects when a station computer is not functioning, wherein those projectors controlled by the station computer are controlled by another station computer situated at some other place.

A further embodiment can also be used as "feedback" and monitoring in statistical analysis by a system administrator with respect to whether or not vehicles keep to the timetable, when the display of information is interrupted either because the display device is obstructed or because the projector is obstructed. In one embodiment, the computerized devices

The present invention also relates to an arrangement of apparatus for carrying out the aforesaid method, said apparatus including the aforesaid devices and an exposure handler which creates the exposure list.

BRIEF DESCRIPTION OF THE DRAWINGS

The following description makes reference to the text in the accompanying drawings to provide a better understanding of the embodiments of the present invention, said drawings illustrating schematically a system for coordinating and controlling projectors in a digital information system for displaying information in accordance with the invention.

DETAILED DESCRIPTION OF PREFERRED EMBODIMENTS OF THE INVENTION

The present invention relates to a method for the dynamic coordination and control of projectors in a digital information system for displaying information on at least one display device via at least one projector for each display device, wherein the information is displayed in places that are accessible to and frequented by a general public. The invention also relates to an arrangement of apparatus for carrying out the method.

Although implementation of embodiments are limited in the following to subway railway stations, it will be understood that the invention is not restricted to these embodiments. As before, mentioned, the inventive system can be used in places where large sections of the public are known to visit, such as railway stations, airports, outdoor locations, etc., in addition to subway stations.

Preferred embodiments of the invention will now be described in detail with reference to the accompanying drawings, which illustrate schematically a system **10** for coordinating and controlling projectors in a digital information system for displaying information on display devices, such as free standing picture screens, wall-mounted screens, walls, and overhead screens or other means suitable for reproducing or exposing picture information in the form of text, stills, movable pictures, images, etc. (displays not shown in the drawing).

In the main, the system is comprised of a control centre **12** having a communication interface **14** which connects an unlimited number of computerized devices **16, 18, 20** which are placed at desired distances from one another for the control of projectors **22** whose projector images or pictures are displayed in the aforesaid public places.

The illustrated system also includes an advertising agency which is connected to the control centre **12** through the medium of a computer **24** and a modem **26**. Although only one modem is shown connected to the central computer **28** of the control centre, it will be understood that modem [poles] *pools*, telephone switching centres and other similar devices may be used to this end in accordance with present-day techniques.

The central computer **28** in the control centre **12** also includes databases **30**, in the illustrated case two databases. The databases **30** may be externally connected to the central computer. The control centre also includes working stations **32**, which are preferably connected to the central computer **28** via a Local Area Network (LAN) in accordance with known techniques. The working stations **32** are used by the personnel serving the control centre **12**, in monitoring, checking, maintaining and updating functions in the central

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working stations, for instance when information is directed specifically to travellers and passengers traveling by ship, train, subway, aircraft or some other vehicular traffic who require specific information. The information may concern the arrival times and departure times of passenger-carrying vehicles. The administrator controls internally how, what, when or where the information shall be displayed by the projectors 22. An important feature in this context, however, is that external information mediators 24 are able to give control instructions to the projectors 22 with regard to the information that the external mediators 24 desire the system 10 to display via the projectors 22, each on its own initiative and communication-wise transparent via modems 26. This can be achieved in accordance with one embodiment of the invention without involving the working stations 32 in the procedure of transmitting the control instructions to the central computer 28.

The term information mediator (24) used in the following shall be interpreted in its widest meaning, i.e. as not only referring to advertising agencies but to all companies and private persons who wish to utilize the system 10 for commercial reasons or for the display of information that concerns a general public. At present a mediator which wishes to display information in public places is normally forced to wait about two weeks, perhaps longer, before his order can be implemented and the information publicly displayed. With the inventive digital information system 10, the information can be displayed principally in real time, i.e. at the time of making the order, possibly with a short delay due to processing, fully-booked exposure lists and other quickly passing causes. Furthermore, an external information mediator 24 is able to put through information to the system 12 twenty-four hours a day, whereupon the information can be included instantaneously in an exposure list, as illustrated in more detail below.

Those external information mediators which connect to the control centre 12 via modems are, in one embodiment of the invention, connected to the control centre via specially designed interfaces (drive routine means) for data and telecommunication. In this way, only external mediators 24 having the correct interface are able to connect transparently to the control centre 12 for delivering control instructions in the projectors 22, which avoids unauthorized access to the display of such information and misuse of the system. In this regard, the special interface, which may be included in the computers of external mediators, also includes commercially available code keys or other codes sent between the control centre 12 and the computer 24 of the external mediator to verify the right to enter control instructions into the central computer 28, without the administrator needing to supply through the working stations 32 further information or authority permitting access of the external information mediators 24 to the central computer for transmitting system transparent control instructions to the projectors 22.

In accordance with the invention, the control centre 12 has a communication interface 14 [against] with the computerized devices 16, 18, 20 situated on shifting positions or places for projector coordination and control.

The drawing shows specifically a radio link which forms an interface between the control centre 12 and the computerized devices 16, 18, 20, this interface being a preferred interface, although not necessarily the sole possible interface. Other interfaces for transmitting information between the control centre 12 and the computerized devices 16, 18, 20 may consist of a cable-carried ISDN solution (Integrated

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In one embodiment of the invention relating to subway station 1, the computerized device 16 is comprised of a station computer (server) which either includes or is connected externally to a hard disk 36, wherein the station computer 34 is connected to a plurality of projector computers 38, three such projector computers in the illustrated case, which transmit control information to connected projectors 22, only one of which is shown. The projector computers 38 have the form of PC units with picture screens in the illustrated case. The information sent to projectors 22 can be monitored on the picture screens of the PC units 35 and edited by personnel stationed at different locations within the subway station 16, or from a central location. In the illustrated embodiment, station 2, referenced 18, and station 3, referenced 20, comprise other subway stations that are equipped with devices similar to the devices of the subway station 16, although without showing the projector computers 38 and the projector 22. It is assumed, however, that these stations also include projector computers 38 and at least one projector 22.

In an alternative embodiment of the device or devices 38, i.e. the projector computers 38, are included in the station computer 34, the projector or projectors 22 is/are controlled directly from the station computer 34.

In yet another embodiment of the devices included in the computerized devices 16, 18, 20, the projector 22 is replaced with an electronic display (not shown), such as a large picture screen in LCD technology, light-emitting diode technology (LED technology) or the like. The station computer 34 is then included in the large picture screen or is connected externally thereto. Preferably, the projector computer 38 in the station computer 34 and the database 36 are also included. Information is transmitted from the control centre 12 generally in the same manner as that before described. However, each separate large picture screen may be addressed directly through a radio network 14, wherein the screens are controlled from the control centre 12 which includes redundancy. Thus, in the illustrated case, the computerized devices 16, 18, 20 form an electronic display with control computer 34, said projector 22 effecting the display.

According to one embodiment, the computerized devices 16, 18, 20 may include redundancy by virtue of all databases 36 of hard disks on the stations 16, 18, 20 including the same projector control information or instructions for monitoring the system in a subway station 16, 18, 20. Thus, all information is copied between the station computers 34 and their databases 36 via the communications interface 14 from the central computer 28. This means that a computerized device for displaying information in a subway station via projectors 22 will not be disabled should one or two of the stations shown in the drawing suffer a computer or hard disk power down in a station computer 34. In the event of a power down in a station computer 34, the communications interface 14 can be coupled to a switch which automatically bypasses the station computer and connect projectors 22 connected to the power down computer 34 to one of the station computers 34 that is still in function (the switch is not shown in the drawing).

The digital information system 10 has been described in the foregoing with regard to respective hardware and interfaces. Implementation of the present invention in achieving the objects and purposes thereof will now be described more specifically.

The illustrated central computer 28 is divided into three

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