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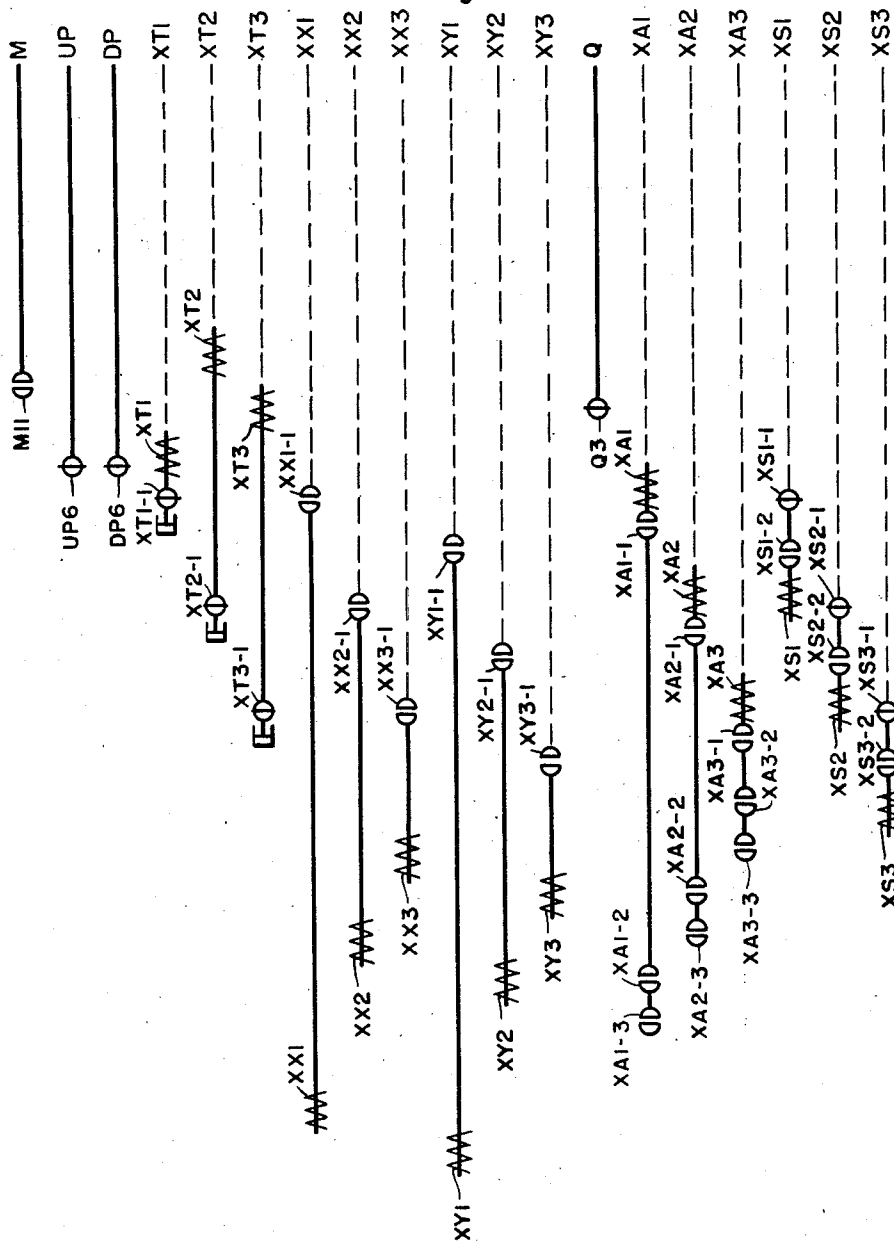
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SUPERVISORY SYSTEMS FOR ELEVATORS

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Fig. 1A.



WITNESSES:

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SUPERVISORY SYSTEMS FOR ELEVATORS

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This invention relates to supervisory systems for improving the efficiency of apparatus and it has particular relation to systems for producing vocal messages for the purpose of expediting elevator service.

Apparatus which is subject to control by persons may provide inefficient service due to the improper exercise of controls by persons utilizing such apparatus. The problem can be adequately considered by reference to an elevator system. Although the invention can be described with reference to an elevator system wherein car attendants are located in the elevator cars, the invention is particularly suitable for elevator systems which are designed for operation without car attendants. For this reason the invention will be described with particular reference to the latter type of system.

If an elevator car is assigned to leave a floor the departure of the elevator car may be undesirably delayed by the act of a person in holding the doors of the elevator car open. It will be understood that in modern elevator systems an elevator car is not allowed to start until all doors associated therewith are closed.

A further problem arises in the case of an elevator car which is fully loaded before its doors close. Under such circumstances persons may endeavor to enter the fully loaded elevator car and thus delay its departure.

As a further illustration of problems encountered, an elevator car may be unable to start. Such inability may arise from the removal of the elevator car from service or from a system failure. Under such circumstances persons within the elevator car are at a loss as to the proper procedure to be followed.

In accordance with the invention, suitable information is conveyed to persons for the purpose of improving the efficiency of apparatus which is subject to the control by such persons. Although it is possible to convey some information by means of lights, the proper location of such lights in the available space may present a problem difficult of solution. It should be understood that such information should impress itself on persons for whom the information is intended.

Although signals such as buzzers may be operated when improper operation occurs, such buzzers often are confusing. Persons do not understand the purposes for which the buzzers are operated and the sound of such buzzers tends to become irritating.

In accordance with a preferred embodiment of the invention, information is conveyed to persons for the purpose of assisting them in the proper use of apparatus in the form of prepared vocal messages or intelligible speech. Such sound messages extend completely over a desired area and convey the desired message in an efficient and courteous manner.

For example, if the doors of an elevator car are held open for an unreasonable time after they are intended to close, a prepared vocal message is released such as "Please release the door; this car is required for service at other floors."

If the elevator car becomes fully loaded at a floor, a

vocal message may be released such as "That is all for this trip. Please allow the doors to close."

As a still further example, if the elevator car is removed from service or if it is unable because of a system failure to leave a floor, a vocal message may be released stating that "This car is not in service at present."

It is therefore, an object of the invention to provide apparatus utilized by persons with equipment for delivering prepared vocal messages supervising the operation of the apparatus.

It is a further object of the invention to provide apparatus employing a door with mechanism effective if the door is held open unduly long for delivering a vocal message suggesting that the door be released.

It is also an object of the invention to provide an elevator system having mechanism effective if an elevator car becomes loaded for delivering a vocal message to the effect that no more passengers can be accepted.

It is a still further object of the invention to provide an elevator system with mechanism effective if an elevator car is unable to start to deliver a vocal message informing persons in the vicinity of the elevator car of such inability.

Other objects of the invention will be apparent from the following description taken in conjunction with the accompanying drawing, in which:

Figure 1 is a schematic view with parts in elevation, with parts in perspective, with circuits shown in straight line form and with parts broken away of an elevator system embodying the invention;

Fig. 1A is a key representation showing all or portions of electromagnetic relays or switches employed in the system of Fig. 1. If Figures 1 and 1A are placed in horizontal alignment, corresponding coils and contacts are substantially in horizontal alignment;

Fig. 2 is a view in elevation with parts broken away of a car gate structure suitable for the system of Fig. 1;

Fig. 3 is a view in straight line form of a portion of a circuit employed in the system of Fig. 1; and

Fig. 4 is a view in straight line form of a further circuit embodying the invention.

As previously explained, aspects of the invention may be incorporated in an elevator system wherein car attendants are provided in the elevator cars for supervising the loading, unloading and operation of the elevator cars. However, since the invention is particularly suitable for an elevator system wherein no car attendants are provided for the elevator cars, the invention will be described as applied to such a system. In order to simplify the presentation of the invention, it will be assumed that the invention is applied to the elevator system shown in the Carney et al. patent 2,172,187. By structure of the Carney et al. system herein is incorporated by reference.

A number of reference characters are employed in the drawing which also are employed in the aforesaid Carney et al. patent to designate similar apparatus. These components may be listed as follows:

Apparatus for elevator car A

- *M—Control conditioning relay
- *UP—Up direction preference relay
- *DP—Down direction preference relay
- E—Call buttons in car
- I—Inductor relay on car
- Z—Car gate motor
- DC—Door closing relay
- *A—Elevator car
- 10—Hatchway
- 11—Cable
- 55—Safety contact members
- 1T—Hatchway door motor

1G—Hatchway door motor switch
 IUF—Floor call pushbutton
 19—Car gate
 16—Hatchway door
 DO—Door opening relay
 W—Door control relay
 L6+ } Direct current buses
 L6- }
 *Q—Gate and door interlock relay
 CL—Limit switch

The components in the above list designate identical components in the drawings and in the aforesaid Carney et al. patent with the following exceptions identified in the list by an asterisk:

The control conditioning relay of the Carney et al. patent has added thereto a pair of make contacts M11 which are illustrated in Fig. 1 of the attached drawings. These contacts are open when the relay M is deenergized and dropped out and are closed when the relay is energized and picked up.

To the up direction preference relay UP of the Carney et al. patent, a pair of break contacts UP6 are added. These contacts are closed when the relay is dropped out and are opened when the relay is picked up.

To the down direction preference relay DP of the Carney et al. patent a set of break contacts DP6 are added. These contacts are closed when the relay is dropped out and are opened when the relay is picked up.

To the gate and door interlock relay Q of the Carney et al. patent a set of break contacts Q3 are added. The contacts Q3 are closed when the relay Q is dropped out and are opened when the relay Q is picked up.

Certain additions are made to the elevator cars. Thus for the elevator car A, a door-hold pushbutton DH is added. As shown in Fig. 3, this switch has two sets of contacts DH1 and DH2 which are normally biased to closed conditions. When the switch is pressed, both sets of contacts are open as long as the switch continues to be pressed.

A transducer such as a loud speaker SP is provided in the vicinity of the elevator car for converting electrical energy into sound. Preferably the loud speaker SP is mounted in the elevator car for movement therewith.

Mechanism also is provided which is responsive to a person within the elevator car. For example, two switches LR1 and LR2 are illustrated and are biased normally to their closed conditions. The switch LR1 may be manually operated to open condition when one or more persons are in the elevator car A. The switch LR2 may be manually operated to open condition when the elevator car A is fully loaded.

Preferably the switches LR1 and LR2 are automatically operated. To this end, the elevator car may be provided with a load measuring platform LR which is mounted on suitable springs LRS on the floor of the elevator car. When one or more persons enters the elevator car, the platform is moved against the bias of the spring sufficiently to open the switch LR1. When a full load enters the elevator car A the platform LR is deflected sufficiently to engage an operating arm for the switch LR2 and open such switch.

Suitable mechanism is provided for the elevator car A to indicate the presence of an object or obstruction in the closing path of the car gate 19. As shown in Fig. 2, two sets of contacts SE1 and SE2 are normally biased to their closed conditions. These contacts are intended to open when an object or obstruction is in the closing path of the car gate 19. For example, the car gate 19 may be provided with a conventional safety edge SE. For the purpose of illustration it will be assumed that the safety edge SE is mounted through springs SES on the edge of the car gate 19 which is the leading edge during a closing movement of the car gate. When the safety edge encounters an obstruction or if the safety edge is pressed by a person adjacent the elevator car, the safety edge

is deflected towards the car gate 19 to open the sets of contacts SE1 and SE2 as long as the safety edge continues to remain deflected.

The only remaining change in the system of the aforesaid Carney et al. patent is illustrated in Fig. 3. Fig. 3 reproduces the operating circuits for the door closing relay DC which appear in Fig. 4 of the Carney et al. patent. The only changes in the circuits consists in the provision of the contacts SE1 and DH1 through which current for energizing the door closing relay DC must flow. As clearly shown in Fig. 3, if either of the sets of contacts SE1 or DH1 are open, the relay DC cannot be energized.

It will be understood that whenever apparatus specific to car A is set forth, similar apparatus is provided for each additional elevator car employed in the system. For example, in Fig. 1, a loud speaker BSP is provided for the elevator car B. A similar loud speaker CSB would be provided for a third elevator car if a third elevator car were included in the system. It will be noted that for each component employed for the elevator cars B and C, the reference character for the corresponding component associated with the elevator car A is employed but is preceded by a prefix B or C to denote that the component is associated with the elevator car B or C respectively.

The drawings show a number of components which are added to the Carney et al. system. These additional components may be listed as follows:

Additional apparatus for car A

XT1—First timing relay
 XT2—Second timing relay
 XT3—Third timing relay
 XA1—First sound start relay
 XS1—First sound stop relay
 XA2—Second sound start relay
 XS2—Second sound stop relay
 XA3—Third sound start relay
 XS3—Third sound stop relay

Apparatus common to all cars

XX1—First auxiliary sound start relay
 XY1—First auxiliary sound stop relay
 XX2—Second auxiliary sound start relay
 XY2—Second auxiliary sound stop relay
 XX3—Third auxiliary sound start relay
 XY3—Third auxiliary sound stop relay

In accordance with the invention vocal messages are produced under predetermined conditions. These vocal messages are derived from suitable sources SS1, SS2 and SS3. The sources may include any suitable apparatus capable of producing an electrical output corresponding to a vocal message. For example the vocal message may be recorded or stored in a conventional plastic record having grooves in which a pickup needle rides. Such records are commonly employed in phonographs.

For purposes of illustration it will be assumed that the source SS1 includes an endless belt or tape 100 which is mounted in a loop by means of drums 101 and 103. The drum 101 is coupled to an electric motor 105 for rotation in the direction of the arrow 107. The tape 100 has a vocal message suitably stored therein and a pickup 109 is located adjacent the tape for the purpose of picking up the message stored in the tape. The output of the pickup is an electrical output representing the message stored in the tape and it is amplified by means of a conventional electric amplifier 111. The output of the amplifier 111 is supplied to the primary winding of an output transformer OT1.

The tape 100 may be a magnetic wire or tape in which a vocal message is stored in the form of a magnetic record. Such magnetic sound record devices are well known. However, in the present embodiment it will be assumed

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that the tape 100 is a transparent film on which an opaque sound record has been stored in a conventional manner. In such a case the pickup may be in the form of a photocell and a lamp 113 may be located to direct light through the film or tape 100 into the photocell of the pickup 109.

In order to detect the beginning and end of a message stored in the tape 100, relays XX1 and XY2 are provided. The relay XX1 is a first auxiliary sound start relay which is connected between a brush 115 and a bus L10—. The buses L10— and L10+ represent a suitable source of direct current electric energy.

The brush 115 is biased against the tape 100 which is of insulating material. When a notch cut in the tape 100 reaches the brush 115, the brush projects through the notch into engagement with the drum 103 which is of electroconductive material. The drum 103 is connected through a suitable brush 119 to the bus L10+. The notch 117 is so positioned that the relay XX1 is energized immediately before the beginning of the message stored in the tape 100.

In a somewhat similar manner the relay XY1 cooperates with a brush 121 and a notch 123. The notch 123 is so positioned that the relay XY1 is energized immediately after the conclusion of the message stored in the tape 100 has reached the pickup.

The sources SS2 and SS3 may be similar to the source SS1 and may deliver outputs in a similar manner to the output transformers OT2 and OT3. Relays XX2 and SY2 are associated with the source SS2 and relays XX3 and XY3 are associated with the source SS3 in manners which will be clear from the discussion of the association of the relays XX1 and XY1 with the source SS1.

To illustrate the nature of the records stored in the sources, it will be assumed for the present that the source SS1 has stored therein the message "Please release the door; this car is required for service at other floors." The source SS2 will be assumed to have stored therein the message "That is all for this trip. Please allow the doors to close." The source SS3 is assumed to have stored therein the message "This car is not in service at present."

The output or secondary windings of the transformers OT1, OT2 and OT3 may be selectively connected to any one of the loud speakers SP, BSP and CSP. For example, if the make contacts XA1-2 and XA1-3 are closed, the secondary winding of the transformer OT1 is connected to the loud speaker SP. If the make contacts XA2-2 and XA2-3 are closed, the secondary winding of the transformer OT2 is connected to the loud speaker SP. Should the make contacts XA3-2 and XA3-3 be closed, the loud speaker SP is connected to the secondary winding of the transformer OT3.

The loud speaker BSP similarly may be connected to any one of the three transformers through the pairs of contacts BXA1-2 and BXA1-3, BXA2-2 and BXA2-3, and BXA3-2 and BXA3-3. Similar connections for the loud speaker CSP can be traced in Fig. 1.

Circuits for controlling the relays XA1, XA2 and XA3 now will be considered.

By reference to Fig. 1 it will be noted that the first timing relay XT1 is connected across a suitable source of direct current electric energy represented by buses L9+ and L9— through a circuit having two parallel arms. One of these arms includes in series the contacts DH2 of the door hold switch and the contacts SE2. The remaining arm is intended to be opened whenever the elevator car A is assigned to move from a floor. Although this arm may be manually opened under such conditions, preferably the control of the arm is automatic. To this end, the break contacts DP6 and UP6 are connected in series in the arm.

By reference to the above mentioned Carney et al. patent it will be found that one of the relays DP or UP is always picked up whenever the elevator car A is assigned to leave a floor. Under these circumstances

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the timing relay XT1 can be energized only through the arm containing the contacts DH2 and SE2.

The timing relay XT1 is designed to drop out when the car gate for the elevator car A is prevented from closing for an unreasonably long time. As a specific example, the relay XT1 may be designed to have a relay in drop out of the order of 7 seconds after it is deenergized. Although the relay may be of any desired construction it will be assumed that the delay in drop out is obtained by connecting a suitable resistor 130 across the coil of the relay.

When the timing relay XT1 drops out, it prepares the relays XA1 and XS1 for subsequent energization. For present purposes it will be assumed that the manually operated switch SW1 is closed to shunt the break contacts XS1-1. Following the closure of the break contacts XT1-1, the tape 100 continues to move until the brush 115 enters a notch 117 to energize the first auxiliary sound start relay XX1. This relay closes its make contacts XX1-1 (and similar contacts [not shown] associated with the relays BXA1 and CXA1 for the elevator cars B and C). The closure thus completes an energizing circuit for the first sound start relay XA1 and this relay closes its make contacts XA1-1 to establish a holding circuit around the contacts XX1-1.

The relay XA1 also closes its make contacts XA1-2 and XA1-3 to connect the loud speaker SP to the secondary winding of the transformer OT1. The loud speaker now reproduces the message stored in the tape 100.

If the switch SW1 is closed, the message reproduced by the loud speaker SP is repeated until the first timing relay XT1 is reenergized to open its make contacts XT1-1. However, if only one reproduction of the recorded speech is required the switch SW1 may be opened. Under such circumstances when the speech reaches its end the brush 121 enters the notch 123 to energize the first auxiliary sound stop relay XY1. This closes its make contacts XY1-1 and similar contacts [not shown] associated with the elevator cars B and C. As a result of closure of the contacts XY1-1 the relay XS1 is energized and closes its make contacts XS1-2 to establish a holding circuit around the contacts XY1-1. The relay XS1 also opens its break contacts XS1-1 to interrupt the energization of the first sound start relay XA1. The relay XA1 opens its holding contacts XA1-1 and opens its contacts XA1-2 and XA1-3 to interrupt the production of sound by the loud speaker SP.

Circuits for indicating that the elevator car is fully loaded now will be considered. The second timing relay XT2 is connected for energization across the buses L9+ and L9— through the normally closed contacts LR2. The timing relay XT2 may be of any desired construction capable of having a short time delay in drop out which may be of the order of one second. For purposes of illustration it will be assumed that a resistor 132 is connected across the coil of the relay XT2 to provide the desired delay.

When the elevator car A is fully loaded the platform LR is deflected sufficiently to open the contacts LR2 and the relay XT2 consequently starts to time out. When it drops out, the relay closes its break contacts XT2-1 to prepare the second sound start relay XA2 for energization. The relays XA2 and XS2 thereafter operate to connect and disconnect the loud speaker SP relative to the second source of sound SS2 in the same manner by which the relays XA1 and XS1 controlled the connection of the loud speaker to the first source of sound SS1.

Let it be assumed next that the elevator car A is removed from service. Such removal is accompanied by opening of the switch SR. Since the switch SR now is open the timing relay XT3 is connected across the buses L9+ and L9— only through the contacts LR1. If a person enters the elevator car A the platform LR is deflected sufficiently to open the contacts LR1. Conse-

quently the relay XT3 which has a time delay in drop out of the order of one second starts to time out. The time delay is assumed to be incorporated by connection of a resistor 134 across the coil of the relay XT3.

When the relay XT3 drops out it closes its break contacts XT3-1 to prepare the third sound stop relay XA3 for subsequent energization. Thereafter the relays XA3 and XS3 cooperate to control the connection of the loud speaker SP to the third source of sound SS3 by a sequence which is similar to the sequence by which the relays XA1 and XS1 control the connection of the loud speaker SP to the source of sound SS1.

Let it be assumed next that the switch SR is closed and that the elevator car A is in service. As long as the elevator car gate is open, the break contacts Q3 of the gate and door interlock relay Q are closed, and the third timing relay XT3 remains picked up. Let it be assumed next that a passenger enters the elevator car to open the switch LR1 and that the car gate closes. Assuming that all of the associated hatchway doors are closed the closure of the car gate results in opening of the break contacts Q3. Under normal conditions of operation, the make contacts M11 close before the timing relay XT3 can drop out. It will be recalled that the make contacts M11 are operated by the control conditioning relay M of the Carney et al. patent which picks up when the car A is to start. If under these circumstances the elevator car A has a defect which prevents closure of the contacts M11, the timing relay XT3 finally drops out to connect the loud speaker SP to the source of sound SS3.

Preferably the three relays XA1, XA2 and XA3 are so interlocked that only one of the relays can be picked up at one time. The interlock may be of any desired type and conveniently may be of the mechanical type.

Although circuits have been described in detail only for the elevator car A, it will be understood that the relays BXA1, BXA2 and BXA3 for the elevator car B and the relays CXA1, CXA2 and CXA3 for the elevator car C are operated by circuits similarly associated with them, their elevator cars and the auxiliary relays.

The operation of the system as a whole now may be considered. It will be assumed that the elevator car is at the first floor and that a passenger operates the pushbutton 1UF for the purpose of opening the car gate 19. It will be assumed further that after the car gate opens, two persons enter the elevator car and one registers a call for the fifth floor by pressing the pushbutton 5E.

The entering passengers deflect the platform LR sufficiently to open the contacts LR1. However, since the elevator car A is assumed to be in service, the relay XT3 continues to be energized through the break contacts Q3 and the switch SR.

It will be assumed next that when the elevator car gate 19 starts to close, one of the passengers presses the door hold button to open the contacts DH1 or holds the safety edge to open the contacts SE1. Under such circumstances the door closing relay DC cannot be energized and the elevator car gate remains open. At the same time one of the sets of contacts DH2 or SE2 will be opened.

Since the elevator car A has been assigned to leave the first floor the up direction preference relay UP is energized and picked up by a sequence which is clearly set forth in the Carney et al. patent. As a result of this sequence the break contacts UP6 are opened and the timing relay XT1 is deenergized.

It will be recalled that the first timing relay XT1 may have a time delay in drop out of the order of 7 seconds. If the passenger presses the door hold button or holds the safety edge for a minimum of 7 seconds it follows that the first timing relay XT1 drops out to close its break contacts XT1-1.

The tape 100 continues to move until the notch 117 registers with the brush 115 to pick up the first auxiliary sound start relay XX1. This relay closes its break contacts XX1-1 to complete the following circuit: L9+, 75

XT1-1, XX1-1, XA1, XS1-1, L9-. The relay XA1 now is energized and closes its make contacts XA1-1 to shunt the make contacts XX1-1. Consequently although continued motion of the tape 100 interrupts the energization circuit for the relay XX1 the holding contacts XA1-1 maintain the energization of the first sound start relay XA1.

The relay XA1 also closes its make contacts XA1-2 and XA1-3 to connect the loud speaker SP across the secondary winding of the transformer OT1. The message stored in the tape 100 now is reproduced by the loud speaker SP. This message is "Please release the door. This car is required for service at other floors."

The passenger now releases the door hold button or the safety edge to complete the following circuit: L6+, Q2, DC, DO1, SE1, W1, DH1, L6-. The energization of the door closing relay DC initiates closure of the car gate 19 by a sequence which will be clear from the Carney et al. patent.

At the conclusion of the message, the brush 121 enters the notch 123 to energize the first auxiliary sound stop relay XY1. This relay closes its make contacts XY1-1 to complete with the break contacts XT1-1 an energizing circuit for the first sound stop relay XS1. This relay opens its break contacts XS1-1 to interrupt the energization of the first sound start relay XA1. The sound start relay thereupon opens its holding contacts XA1-1 and opens its make contacts XA1-2 and XA1-3 to disconnect the loud speaker SP from the sound source SS1. It will be recalled that if repetition of the message is desired the switch SW1 may be manually closed to shunt the contacts XS1-1.

The release of the door hold button or of the safety edge also is accompanied by completion of the following circuit: L9+, DH2, SE2, XT1, and 130 in parallel, L9-. The resulting pickup of the first timing relay XT1 results in opening of the break contacts XT1-1 to prevent energization therethrough of the relays XA1 and XS1.

For the next typical operation it will be assumed that the elevator car A is positioned at the first floor and that a sufficient number of persons enter the elevator car to deflect the platform LR and open the contacts LR2. Such opening of the contacts LR2 deenergizes the second timing relay XT2. Upon the expiration of the delay in drop out of this relay which may be of the order of one second the relay drops out to close its break contacts XT2-1.

It will be understood that when the sound tape for the source of sound SS2 is in position to start a message, the second auxiliary sound start relay XX2 is energized and picks up to close its make contacts XX2-1. This completes the following circuit: L9+, XT2-1, XX2-1, XA2, XS2-1, L9-.

The energized second sound start relay XA2 closes its holding contacts XA2-1 to establish a shunt circuit around the contacts XX2-1. The relay XA2 also closes its make contacts XA2-2 and XA2-3 to connect the loud speaker SP across the secondary winding of the transformer OT2. The loud speaker now informs persons within the vicinity of the elevator car that "That is all for this trip. Please allow the doors to close."

At the conclusion of the message, the second sound auxiliary stop relay XY2 picks up by a sequence which will be clear from the discussion of the source SS1, and the relay XY1. The resultant closure of the contacts XY2-1 completes with the contacts XT2-1 an energizing circuit for the second sound stop relay XS2. This relay in turn closes its holding contacts XS2-2 which are located to shunt the contacts XY2-1 and also open its break contacts XS2-1 to interrupt the energization of the second sound start relay XA2.

Following its deenergization the relay XA2 drops out to open its holding contacts XA2-2 and its make contacts XA2-3 to disconnect the loud speaker SP from the source SS2. If a repetition of the message is desired the switch

SW2 may be manually closed to shunt the contacts XS2-1.

The elevator car A now proceeds upwardly in the manner set forth in the Carney et al. patent. When the number of passengers on the platform LR decreases sufficiently the contacts LR2 reclose to reenergize the second timing relay XT2. This relay then opens its break contacts XT2-1 to prevent energization therethrough of the relays XA2 and XS2.

Let it be assumed next that the elevator car A is removed from service and that such removal is accompanied by opening of the switch SR. If a passenger thereafter enters the elevator car A, he deflects the platform LR sufficiently to open the contacts LR1 and de-energize the third timing relay XT3. The third timing relay now closes its break contacts XT3-1 to prepare the third sound start relay XA3 for subsequent energization. When the third source of sound SS3 has its tape in position to start a message, the third auxiliary sound start relay XX3 is picked up by a sequence which will be clear from the preceding discussion of the pickup of the relay XX1 associated with the source SS1. The pickup of the relay XX3 is accompanied by closure of the contacts XX3-1 to complete the following circuit: L9+, XT3-1, XX3-1, XA3, XS3-1, L9-.

The relay XA3 now closes its make contacts XA3-1 to establish a shunt or a holding circuit around the contacts XA3-1. In addition, make contacts XA3-2 and XA3-3 close to connect the loud speaker SP to the third source of sound SS3. Through the loud speaker the passenger learns that "This car is not in service at present." The passenger consequently can move to another one of the elevator cars.

At the conclusion of the message, the third auxiliary sound stop relay XY3 is picked up by a sequence which will be clear from the preceding discussion of the pickup of the relay XY1 associated with the sound source SS1. The relay XY3 closes its make contacts XY3-1 to complete with the contacts XT3-1 an energizing circuit for the relay XS3.

The relay XS3 closes its make contacts XS3-2 to establish a holding circuit around the contacts XS3-1 and also opens its break contacts XS3-1 to interrupt energization of the third sound start relay XA3.

The relay XA3 opens its holding contacts XA3-1 and opens its make contacts XA3-2 and XA3-3 to interrupt the connection of the loud speaker to the third source of sound SS3.

When the passenger leaves the elevator car A the switch LR1 recloses to energize the timing relay XT3. This relay then opens its break contacts XT3-1 to prevent energization therethrough of the relays XA3 and XS3. If repetition of the message is desired, the switch SW3 may be manually closed to shunt the contacts XS3-1.

Let it be assumed next that the elevator car is in service and that the switch SR is closed. Under these circumstances, it will be assumed that a passenger enters the elevator car A. In entering the elevator car the passenger opens the switch LR1 but the third timing relay XT3 continues to be energized through the break contacts Q3 and the switch SR.

The passenger now registers a call for the fifth floor by pressing the pushbutton 5E. It will be assumed that the car gate 19 closes in the manner set forth in the Carney et al. patent and that following its closure the gate and door interlock relay Q opens its break contacts Q3 to interrupt the energization of time delay relay XT3.

Normally the make contacts M11 operated by the control conditioning relay M of the Carney et al. patent should close before the relay XT3 drops out, however it will be assumed that because of some defect in the system, the make contacts M11 fail to close and at the expiration of the delay for which the relay XT3 is designed the relay drops out to close its break contacts XT3-1. These contacts initiate the connection of the

loud speaker SP to the source of sound SS3 to advise the passenger that "This car is not in service at present" by a sequence which will be clear from the preceding discussion.

Other information may be conveyed by the transducers or loud speakers. For example, a source of sound may announce that: "This car is now on an up trip" and a further source may announce that: "This car is now on a down trip."

Let it be assumed that the source of sound SS2 has a record of "This car is now on an up trip," that the second timing relay XT2 is energized through the break contacts UP6 of the up direction preference relay UP as shown in Fig. 4 and that the time delay of the relay is reduced to say one-half second. When the up-direction preference relay UP picks up to condition the car A for an up trip the loud speaker SP announces that: "This elevator car is now on an up trip." The switch SW2 may be open. If the make contacts M11 of the control conditioning relay M are connected around the break contacts UP6 in Fig. 4 through the switch 150 the loud speaker repeats this announcement each time the elevator car stops at a floor during its up trip. If the contacts UP6 in Fig. 4 were replaced by the break contacts DP6 of the down direction preference relay DP the associated source of sound may be designed to announce in a similar manner that "This car is now on a down trip."

Assume next that the contacts LR2 of Fig. 1 are break contacts of a conventional dispatcher relay which picks up when an elevator car is to be loaded. Such a relay AN is shown, for example, in Patent 2,589,292. If the switch SW2 is closed the associated source of sound SS2 then may be designed to repeat at brief intervals through the loud speaker SP as long as the contacts of the dispatcher relay remained open that: "There will be a short delay until this car leaves."

If the contacts LR2 of Fig. 1 are break contacts of the door closing relay DC and if the second timing relay XT2 has a very short time delay, the associated source of sound may be designed to announce through the loud speaker each time the door closing relay DC picks up: "Watch the doors."

Although the invention has been described with reference to certain specific embodiments thereof, numerous modifications falling within the spirit and scope of the invention are possible.

I claim as my invention:

1. In an elevator system, a structure having floors, an elevator car, means mounting the elevator car for movement relative to the structure to serve the floors, a transducer mounted for movement with the elevator car, said transducer being effective when suitably energized to produce intelligible speech in the elevator car, a source of suitable energy effective when coupled to the transducer for producing a predetermined intelligible speech, and means responsive to a predetermined condition preventing operation of the elevator car when the elevator car is positioned accurately at a floor for operatively coupling the transducer to said source, whereby information concerning the failure of the elevator car to operate may be conveyed to a person within hearing range of the transducer.

2. In an elevator system, a structure, an elevator car having a door, means operable for closing said door, means mounting the elevator car for movement relative to the structure, a transducer effective when suitably energized for producing speech intelligible in the elevator car, a source of suitable energy effective when operatively coupled to the transducer for producing predetermined intelligible speech suggesting that the closure of the door be expedited, interlock means for preventing starting of the elevator car until said door is closed. Timing means responsive to abnormal delay in closure of said door for operating from a first condition to a

second condition, and means responsive to operation of the timing means to the second condition for operatively coupling the source to the transducer to deliver a message suggesting that the closure of the door be expedited.

3. In an elevator system, a structure having floors, an elevator car having a door, means operable for closing said door, means mounting the elevator car for movement relative to the structure, a transducer effective when suitably energized for producing speech intelligible in the vicinity of the elevator car when it is positioned at one of the floors with the door open, a first source of suitable energy effective when operatively coupled to the transducer for producing predetermined intelligible speech indicating that the elevator car should not be further loaded, and means responsive to loading of the elevator car at such floor for effectively coupling the transducer to the source for producing said speech prior to closure of the door, in combination with a second source of suitable energy effective when operatively coupled to said transducer for producing intelligible speech suggesting that closure of the door should be expedited, and means responsive to abnormal delay in closure of the door sufficient to permit transmission of the first-named speech during such delay for operatively coupling the second source to the transducer.

4. In an elevator system, a structure, an elevator car, means mounting the elevator car for movement relative to the structure, service means operable for transferring the elevator car from an in-service to an out-of-service condition, a transducer mounted for movement with the elevator car, said transducer being effective when suitably energized to produce intelligible speech in the elevator car, a source of suitable energy effective when coupled to the transducer for producing a predetermined intelligible speech, and means responsive to operation of the service means to remove the elevator car from service for conditioning the transducer to be operatively coupled to said source, said predetermined speech indicating that the elevator car is not available for service.

5. In an elevator system, a structure, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, a separate transducer for each of the elevator cars, each of said transducers being effective when suitably energized to produce speech intelligible in the vicinity of the associated elevator car, a single source of suitable energy effective when coupled to any of the transducers for producing a single predetermined intelligible speech, and means operable for selectively connecting the source to each of the transducers, said means being responsive to a predetermined condition wherein any of said elevator cars does not provide prompt service for operatively connecting the transducer for said last named elevator car to the source, whereby information concerning said predetermined condition may be conveyed to a person within hearing range of the operatively connected transducer.

6. In an elevator system, a structure, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, a door for each of the elevator cars, mechanism operable for closing each of the doors, interlock mechanism for preventing starting of any of the elevator cars until the door for the last-named elevator car is closed, a separate transducer for each of the elevator cars, each of said transducers being effective when suitably energized to produce speech intelligible in the vicinity of the associated elevator car, a single source of suitable energy effective when coupled to any of the transducers for producing a single predetermined intelligible speech suggesting that closure of the door of the associated elevator car be expedited, and means operable for selectively connecting the source to each of the transducers, said means including separate timing means for each of the cars operable from a first condition to a second condition in response

to failure of the associated one of the doors, when open, to close within a predetermined time after closure of the door is initiated, and means responsive to operation of any of the timing means to the second condition for operatively coupling the transducer associated with such timing means with the source.

7. In an elevator system, a structure, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, a separate transducer for each of the elevator cars, each of said transducers being effective when suitably energized to produce speech intelligible in the vicinity of the associated elevator car, a single source of suitable energy effective when coupled to any of the transducers for producing a single predetermined intelligible speech suggesting that the associated elevator car is loaded, and means operable for selectively connecting the source to each of the transducers, said means being responsive to loading of any of the elevator cars for operatively connecting the transducer for the loaded elevator car to the source.

8. In an elevator system, a structure, a plurality of elevator cars, means mounting each of the elevator cars for movement relative to the structure, separate service means for each of the cars, each of the service means being operable to a first condition for placing the associated one of the elevator cars in service and to a second condition for removing the associated one of the elevator cars from service, a separate transducer for each of the elevator cars, each of said transducers being effective when suitably energized to produce speech intelligible in the vicinity of the associated elevator car, a single source of suitable energy effective when coupled to any of the transducers for producing a single predetermined intelligible speech indicating that the associated elevator car is not available for service, separate passenger-actuable means for each of the cars, and means responsive to operation of the passenger-actuable means for any of the cars while the associated service means is in the second condition for selectively connecting the source to the associated one of the transducers, and means responsive to operation of the service means to place any of the elevator cars in service for rendering the passenger-actuable means for the last-named elevator car ineffective to establish the connection of said source to the transducer for the last-named elevator car.

9. An elevator system comprising a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the structure, and control means for moving the elevator car relative to the structure and for stopping the elevator car at any of said floors, in combination with a transducer mounted for movement with the elevator car, said transducer when suitably energized being effective for producing speech which is intelligible in the vicinity of the elevator car, and means effective in response to a predetermined manual deed which prevents prompt service by the elevator car at each floor at which the elevator car stops for operatively coupling the transducer to said source, said speech containing information concerning said manual deed which is audible to a person within hearing range of the transducer.

10. An elevator system comprising a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the structure, door means for the elevator car, operating means for opening the door means at each of said floors at which the elevator car stops and thereafter closing the door means, and control means for moving the elevator car relative to the structure and for stopping the elevator car at any of said floors, in combination with a transducer mounted for movement with the elevator car, said transducer when suitably energized being effective for producing speech which is intelligible in the vicinity of the elevator car, and means effective in response to a

predetermined interference with closure of said door means at any of said floors at which the elevator car stops for operatively coupling the transducer to said source, said speech containing information concerning the interference which is audible to a person within hearing 5 range of the transducer.

11. An elevator system comprising a structure having a plurality of floors, an elevator car, means mounting the elevator car for movement relative to the structure, and control means for moving the elevator car relative 10 to the structure and for stopping the elevator car at any of said floors, in combination with a transducer mounted for movement with the elevator car, said transducer when suitably energized being effective for producing speech which is intelligible in the vicinity of the elevator 15 car, and means effective in response to a predetermined loading of the elevator car at each of the floors at which

the elevator car stops for operatively coupling the transducer to said source, said speech containing information discouraging additional persons from boarding the elevator car.

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