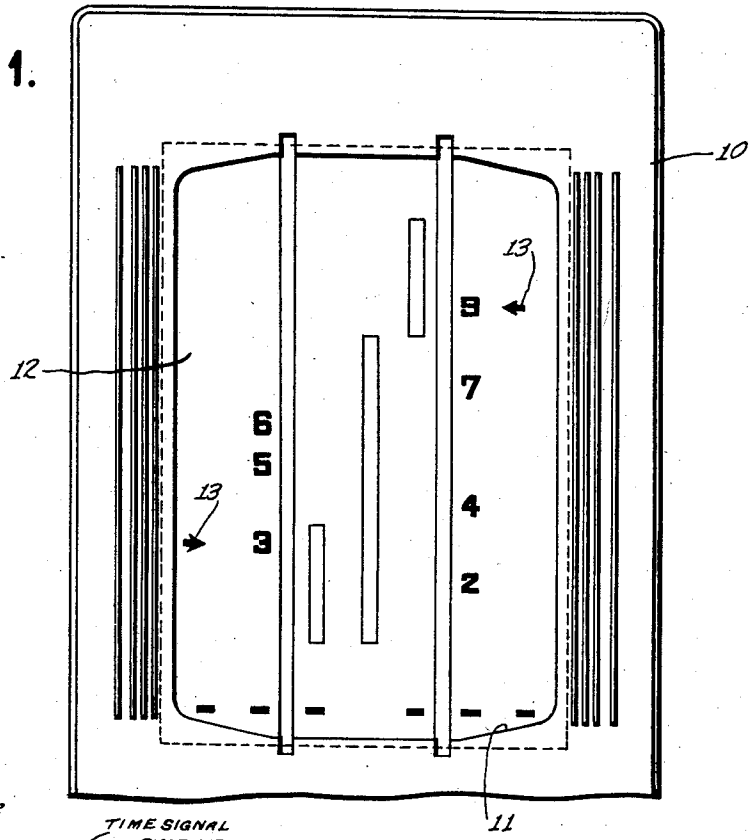
March 27, 1945. K. M. WHITE ET AL 2,372,348

ELEVATOR SIGNALING SYSTEM

Filed Dec. 5, 1941

FIG. 1.



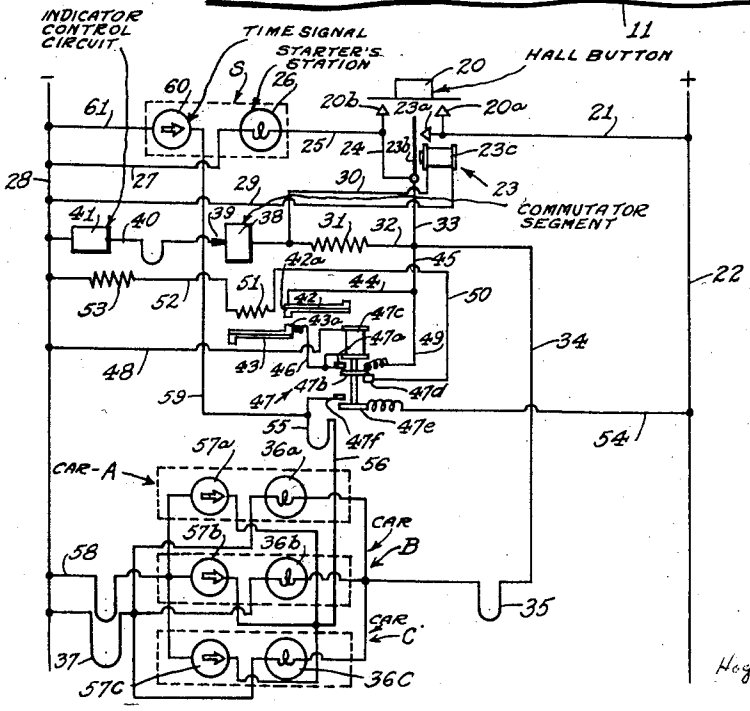


FIG. 2.

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ELEVATOR SIGNALING SYSTEM

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Application December 5, 1941, Serial No. 421,758

5 Claims. (Cl. 177—336)

This invention relates to elevator signaling systems and relates more particularly to systems for indicating that a passenger who has signaled for an elevator car to stop at a floor of a building has been waiting for more than a predetermined length of time.

In the interests of operating efficiency and particularly during rush hours, it often happens that passengers waiting at intermediate floors of a building are forced to wait for extended periods of time for a car. Often the operator of the car cannot stop for the reason that the car is already filled and no good purpose would be served by stopping and thereby delaying the transportation of the passengers already in the car.

Inasmuch as extended periods of waiting cause annoyance to the prospective passengers and complaints regarding the elevator service, it is desirable to have some means for indicating to the elevator operator and/or the starter the fact that some of the prospective passengers have been waiting for too long a period of time so that a car can be dispatched to pick them up.

In accordance with the present invention, we have provided a simple and accurate timing mechanism which controls signals in the elevator car and/or at the starter's station to indicate that a passenger has been waiting for a predetermined length of time after signaling for a car to stop. Preferably this waiting time signal is associated with the usual immediate signal in order to indicate comparative waiting time.

More particularly, the elevator car and/or the starter station may be provided with a suitable signaling panel having the usual signals thereon for indicating the floors at which hall buttons have been pressed. Associated with the signal lights are other signaling means which become effective to indicate that a predetermined period of time has passed since the hall buttons have been pressed.

The system for actuating these latter time signals includes a thermostatic switch which is adjusted to close after a predetermined length of time in response to heat emitted by an electrical resistance heater or other heater element which is energized upon actuation of the hall signal button. This thermostatic time switch preferably is arranged in such a manner as to close a self-holding circuit that energizes the signaling means in the elevator car and/or at the starter's station and retains it in energized condition until a car stops at the floor corresponding to the signal. This system has the advantage that when applied to various elevator control systems whether manually, semi-automatically or fully automatically controlled, the operator or the starter or both are advised at all times as to the efficiency of the service in collecting and delivering passengers.

For a better understanding of the present invention, reference may be had to the accompanying drawing in which:

Figure 1 is a plan view of a typical form of signaling panel to which the invention is applied; and

Figure 2 is a diagrammatic showing of the timing and signaling system embodying the present invention.

As shown in Figure 1, the signaling panel may include a frame 10 which may be mounted in the wall of a building corridor or the wall of an elevator car. The frame or panel 10 is provided with a central opening 11 in which is mounted a translucent or transparent member 12 behind which may be mounted, in the usual way, a series of electric light bulbs for indicating the various floors at which the elevator car should stop. The translucent or transparent member 12 may be provided with a series of numbers 1, 2, 3, 4, etc., corresponding to the floors of the building, the right hand group being responsive to the "up" hall buttons and similar numbers on the left hand side which are responsive to the "down" hall buttons.

Adjacent each of the floor signaling numbers and mounted on the member 12 are a series of arrows 13 which may be illuminated by electric light bulbs behind them to indicate the fact that a passenger at the floor, for example, floor 9, has been waiting for longer than a predetermined period of time, for example, one or two minutes.

Referring now to Figure 2, a signaling system is shown which controls the lights for illuminating the various floor numbers as well as the floor signaling arrows 13, referred to above. The elevator controls are not disclosed in the system of Figure 2 for the reason that they do not form a part of the present invention, and any desired type of elevator control system may be used.

Figure 2 illustrates the circuit for one hall button for one floor, for example, the "up" signaling button. It will be understood that this system may be duplicated for the "up" and "down" hall buttons for each floor.

The "up" hall button 20, for example, may be of the dual contact type having a front contact 20*a* and a back contact 20*b*. The front contact 20*a* is connected by means of a conductor

21 to one side 22 of the mains and to a contact 23a of a relay 23. The back contact 20b is connected by a conductor 24 to the armature 23b of the relay 23 and by a conductor 25 to the floor signaling lamp 26 at the starter's station S. The circuit through the lamp 26 is completed by a conductor 27 to the other side of the mains 28.

The coil 23c of the relay 23 is connected by means of a conductor 29 to the main 28 and the opposite terminal of the coil 23c is connected by means of a conductor 30 to one end of a balancing resistor 31. The opposite end of the balancing resistor 31 is connected by means of conductors 32 and 33 to the armature 23b of the relay 23.

The back contact 20b of the hall button switch 20 and the armature 23b of the relay are connected by the conductor 33, the conductor 34 and a conductor 35 of the elevator car cable to the signaling lamps 36a, 36b and 36c in three elevator cars, identified as cars A, B and C. The lamps 36a, 36b and 36c are connected in parallel and have their opposite contacts connected by the conductor 37 of the elevator cable to the main 28.

Upon closing of the contacts 20a and 20b by means of the button 20 the coil 23c of the relay 23 is energized, drawing the armature 23b into engagement with the contact 23a. When the contacts 20a and 20b engage, the circuit is completed from the main 22 through the conductor 21, the contact 23a, armature 23b, conductor 33, conductor 32, resistance 31, conductor 30, relay coil 23c and conductor 29 to the main 28. When the coil 23c of the relay 23 is energized, the contacts 23a and 23b engage and render the relay circuit self-holding. A circuit is also completed by engagement of the switch contacts 20a and 20b through the starter floor signaling lamp 26 and each of the elevator lamps 36a, 36b and 36c thus signaling at these stations the presence of a passenger at the floor corresponding to the location of the button 20. This circuit is retained closed by the self-holding relay circuit after disengagement of the contacts 20a and 20b.

In order to deenergize this self-holding circuit, the armature 23b of the relay 23 is connected by means of conductors 32 and 33 and the resistance 31 to a commutator segment 38 which is engageable by a brush 39 which is connected by a wire 40 through a circuit 41 (not shown) to the main 28. The circuit 41 may be of the type disclosed in the application Serial No. 421,757 filed December 5, 1941, by Harry Hadsel, now Patent No. 2,338,582, dated January 4, 1944.

The circuit 41 is such that when the elevator control lever is released a direct connection is made between the brush 39 and the main 28. Upon engagement of the brush 39 with the commutator segment 38, a circuit is completed through the resistor 31, conductors 32 and 33, the armature 23b, the contact 23a and the conductor 21. The relay coil 23c is shorted out of the circuit inasmuch as both conductors 29 and 30 are connected directly to the main 28, permitting disengagement of the armature 23b from the contact 23a and thereby extinguishing the lights 26, 36a, 36b and 36c.

The above described circuit may be modified considerably and other types of signaling circuits may be used, if desired, inasmuch as the timing and indicating system embodying the present invention is not dependent upon the use of this type of system.

The timing and signaling system embodying the present invention will now be described. The timing mechanism system includes a pair of bimetallic thermostats 42 and 43 which may be mounted either in the car or preferably in fixed position in the building containing the elevators. The thermostatic elements 42 and 43 are preferably arranged so that they will be exposed to the same temperature conditions so that they can move simultaneously in response to change in temperature.

The contact 42a of the thermostatic element 42 is connected by means of a conductor 44, a conductor 45 and the conductor 33 to the armature 23b of the relay 23. The contact 42a of the compensating thermostat 42 is disposed normally in spaced relationship to the contact 43a of the thermostatic element 43, and inasmuch as they are adjacent to each other, variations in the local temperature of their environment will not alter the spacing between the contacts. The contact 43a is also made adjustable relative to contact 42a to vary the time required to bring them into engagement. Alternatively, the heater 51 may be adjusted toward or away from the thermostat 43 to vary the timing.

The contact 43a is connected by a conductor 46 to one side of the coil 47c of the multi-contact relay 47 and to a back contact 47a of this relay. The other side of the coil 47c is connected by means of a conductor 48 to the main 28. The back armature 47b of the relay 47 is connected by a conductor 49 to the conductors 44 and 45 so that upon movement of the armature 47b in response to energization of the coil 47c, the armature 47b will engage the contact 47a. At the same time, the armature 47b will move away from a contact 47d which is connected by means of a conductor 50 to one end of a heating resistance 51, the opposite end of which is connected by a conductor 52 and a resistance 53 to the main 28.

With this arrangement, when the relay 23 is closed in response to closing of the button switch 20, a circuit will be completed from the main 22 through the relay 23, the conductor 45, the conductor 49, the armature 47b, the contact 47d, the conductor 50, the heating resistance 51, the conductor 52, the resistance 53 to the main 28, thereby causing the heater resistance to become energized and to generate heat. The heating resistance 51 is disposed adjacent to the thermostatic element 43 which is so arranged that upon increase in temperature the contact 43a will move toward and engage the contact 42a. Upon engagement of the contacts 42a and 43a, the circuit is completed from the main 22 through the relay 23, conductor 45, conductor 44, contact 42a, contact 43a, wire 46, coil 47c and conductor 48 to the main 28, thereby energizing the coil 47c and moving the armature 47b upwardly as viewed in Figure 2. Upward movement of the armature 47b closes a circuit from the main 22 through the armature 47b, the contact 47a, the relay coil 47c and the conductor 48 to the main 28, thereby maintaining energization of the coil 47c. At the same time the contact 47d is disengaged from the armature 47b, thus breaking the circuit through the heater resistance 51 and allowing this element to cool. Upon cooling of the heater resistance 51, the contacts 42a and 43a of the thermostats disengage without, however, affecting the energization of the coil 47c.

The relay 47 is also used to energize the lamps which illuminate the time signaling arrows 13 of the elevator panel and the starter panel. This circuit is as follows: The second armature 47e of the relay 47 is connected by means of a con-

ductor 54 to the main 22. Normally spaced from the armature 47e but engageable therewith upon energization of the coil 47c is a contact 47f which is connected by means of the conductor 55 in the elevator cable, a conductor 56 to the parallel connected light bulbs 57a, 57b and 57c for illuminating the arrows 13, in each of the elevator cars. The circuit through the lamps 57a, 57b and 57c is completed by means of a conductor 58 in the elevator cable to the main 28. Similarly, the contact 47f is connected by means of a conductor 59 to one side of the lamp 60 for illuminating the arrow at the starter's station S, the other side of the lamp being connected by means of a conductor 61 to the main 28.

The circuit just described, therefore, is responsive to energization of the coil 47c of the relay 47 by engagement of the contacts 42a and 43a of the thermostats in response to heating of the heater coil 51. Thus, when the relay coil 47c is energized, the circuit is completed from main 22 to the conductor 54, the armature 47e, the contact 47f through all of the elevator time signaling lamps 57a, 57b and 57c and the starter time signal lamp 60 to the main 28.

If the elevator has stopped at a floor corresponding to the location of the button 20, the relay coil 23c is deenergized as described above, thereby breaking the circuit through the relay coil 47c, restoring it to the position shown in Fig. 2 and causing the lights 57a, 57b and 57c and 60 to be extinguished. If a car does not stop at this floor, none of the signaling lamps is extinguished because of the operation of the circuit 41 of the system.

From the foregoing description of the present invention, it will be apparent that we have produced a simple, but effective timing and signaling system for indicating that the passenger has been kept waiting too long. The arrangement of the thermostatic elements forming the timing system is such that they are not affected by variations in temperature for the reason that both elements are normally exposed to the same temperature conditions due to their juxtaposition and therefore the gap between the contacts 42a and 43a remains constant except when the heater resistance 51 is energized.

It will be understood that this system may be applied to any number of floors of a building, may be mounted in the elevator control house along with the other control elements of the system and may be applied to existing forms of elevator systems with a minimum of difficulty. Inasmuch as our system does not include any mechanically actuated parts, such as time clocks, electric timing systems and the like, it has few parts to get out of order and, accordingly, replacement and servicing are reduced to a minimum.

It should be understood further that the system described above can be modified widely in so far as its application to existing circuits is concerned and, therefore, the form of the invention described herein should be considered as illustrative only and not as limiting the scope of the following claims.

We claim:

1. In a time signaling system for an elevator system having floor indicating means, a floor switch connected with said indicating means to energize the latter, an electrically controlled holding means connected with said switch and said indicating means for maintaining the latter energized after said switch is actuated and released, and elevator control means for actuating said holding means to deenergize said indicating means upon stoppage of an elevator car at the floor at which said switch has been actuated; the combination of a thermostatic switch movable from open to closed position in response to variations in temperature, electric heating means connected to sail floor switch and said holding means and energized by actuating said switch for gradually increasing the temperature of said thermostatic switch, relay means actuated by closing of said thermostatic switch for deenergizing said electric heating means, and signaling means electrically connected to and responsive to actuation of said relay means for indicating that a predetermined period of time has elapsed since closing of said floor switch.

2. In a time signaling system for an elevator system having floor indicating means, a floor switch connected with said indicating means to energize the latter, an electrically controlled holding means connected with said switch and said indicating means for maintaining the latter energized after said switch is actuated and released, and elevator control means for actuating said holding means to deenergize said indicating means upon stoppage of an elevator car at the floor at which said switch has been actuated; the combination of a pair of thermostatic elements having electrical contacts thereon, said thermostatic elements being movable in response to temperature changes in their environment to maintain said contacts in substantially uniformly spaced relationship, means responsive to actuation of a floor switch for varying the temperature of one of said thermostatic elements to move said contacts into engagement, signaling means adjacent to said floor indicating means, means connected to said contacts and said holding means and responsive to engagement of said contacts under the control of said holding means for actuating said signaling means until a car stops at a floor at which a floor switch has been operated, and means responsive to engagement of said contacts for rendering said temperature varying means inoperative to permit said contacts to disengage.

3. In a time signaling system for an elevator signaling system having floor indicating means actuated in response to the operation of a floor button switch, an electric holding means energized by operation of said button to maintain said floor-indicating means actuated after said signal button switch is operated and released, means for deenergizing said holding means to render said indicating means inactive upon stoppage of an elevator car at the floor at which the switch has been operated; the combination of an electrical signaling means adjacent to said floor indicating means, means comprising normally spaced apart contacts electrically connected to said signaling means, said contacts being engageable and disengageable to energize and deenergize said signaling means, normally deenergized electrically controlled timing means electrically connected with said floor button switch and said holding means, said timing means being energized by operation of said floor button switch to cause said contacts to engage and energize said signaling means after the lapse of a predetermined period of time, and means for disengaging said contacts upon deenergization of said holding means.

4. In a time signaling system for an elevator signaling system having floor indicating means

actuated in response to the operation of a floor button switch, an electric holding means energized by operation of said button to maintain said floor-indicating means actuated after said signal button switch is operated and released, means for deenergizing said holding means to render said indicating means inactive upon stoppage of an elevator car at the floor at which the switch has been operated; the combination of an electrical signaling means adjacent to said floor indicating means, means comprising contacts electrically connected to said signaling means, said contacts being engageable and disengageable to energize and deenergize said signaling means, normally deenergized, electrically controlled timing means electrically connected with said floor button switch and said holding means, said timing means being energized and rendered active by operation of said floor button switch to cause said contacts to engage and energize said signaling means after the lapse of a predetermined period of time, means responsive to engagement of said contacts for deenergizing said timing means, and means for disengaging said contacts upon deenergization of said holding means.

5. In a time signaling system for an elevator system having an elevator car, means for controlling the movements of the car, a signaling switch at each floor, indicating means connected to each switch and actuated thereby, relay means electrically connected with said switch and energized through said switch to maintain an indication by said indicating means, and means responsive to stoppage of a car at a floor at which a switch has been actuated for rendering said relay means ineffective and said indicating means inactive; the combination of a time interval signaling means disposed adjacent to each indicating means, a thermostatic switch, a heating element adjacent to said switch for actuating said thermostatic switch, a relay having first contact means movable into and out of engagement to energize and deenergize said signaling means, second contact means movable into and out of engagement to energize and deenergize said heating element, and other contact means movable into engagement to energize said relay, means connecting said relay means to said thermostatic switch, said other contact means and said contact means to energize said heating means, and to energize said relay upon actuation of said thermostatic switch thereby disengaging said second contact means and engaging said first contact means, and deenergizing said relay upon said relay means being rendered ineffective.

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