Jan. 1, 1952 W. F. EAMES 2,581,245

ELEVATOR DISPATCHING SYSTEM

Filed Aug. 19, 1950 2 SHEETS--SHEET 1

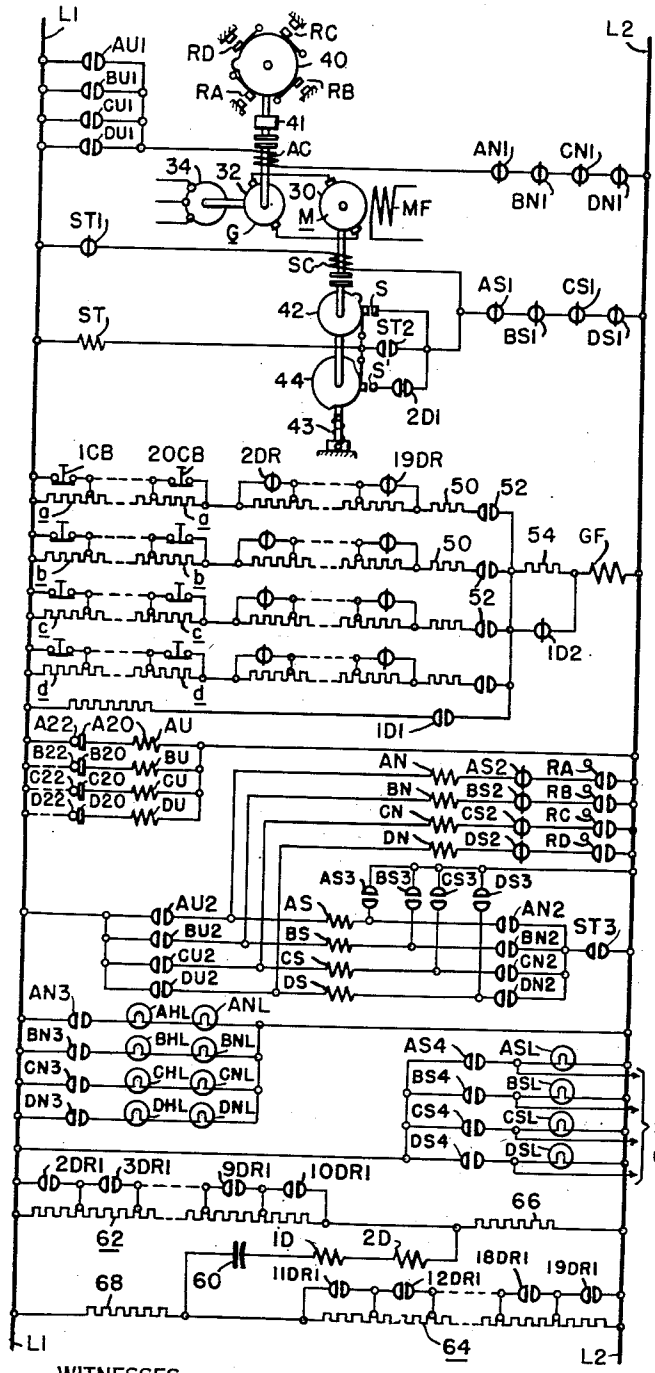


Fig.2.

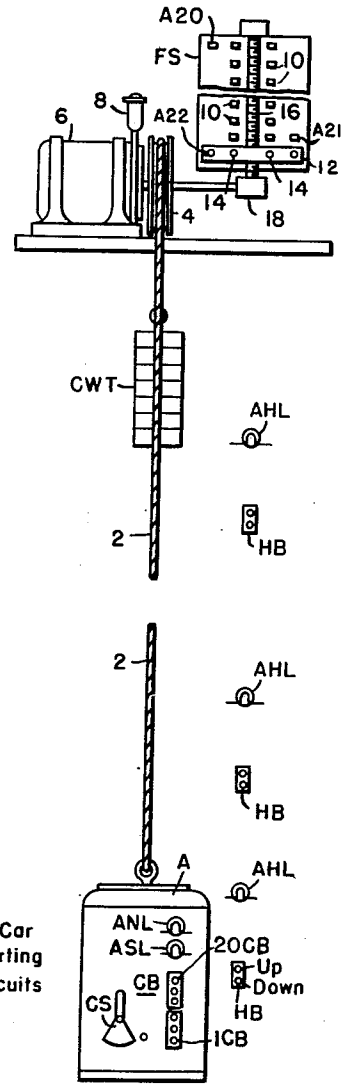


Fig.1.

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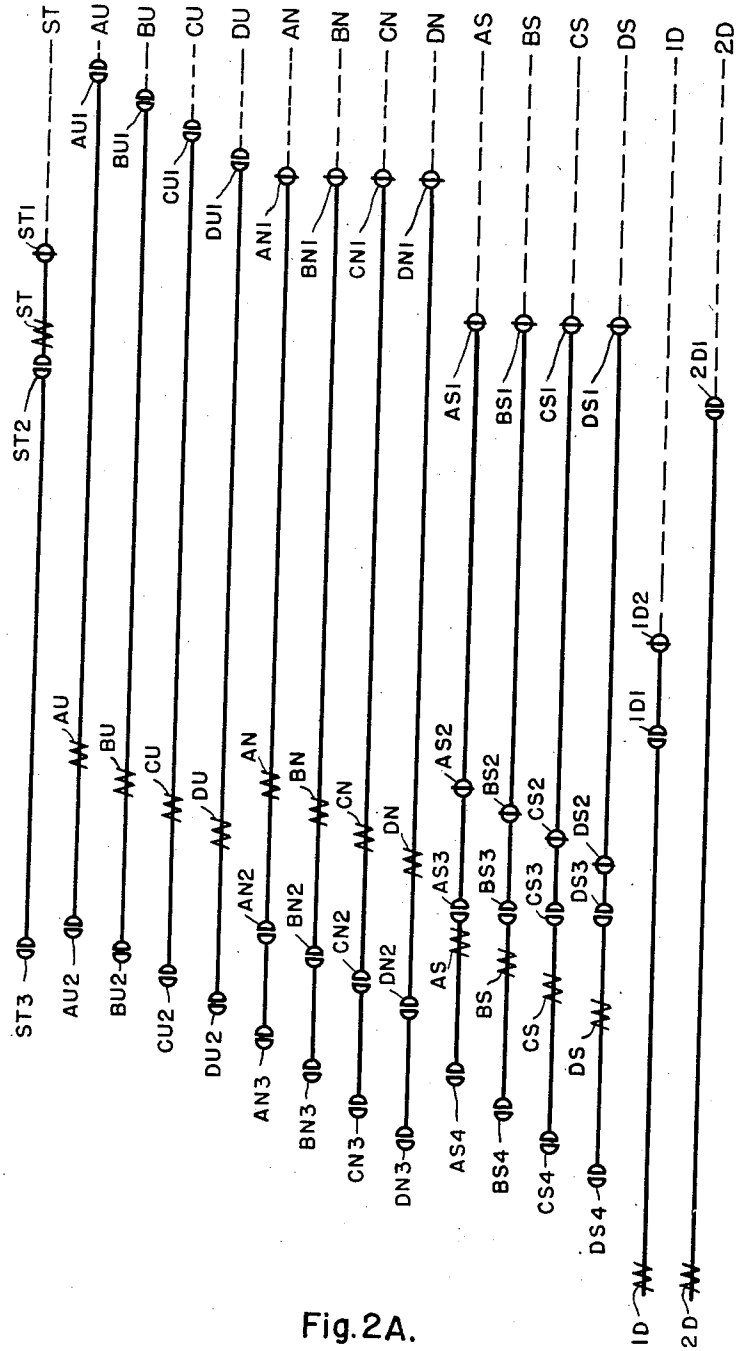


Fig. 2A.

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ELEVATOR DISPATCHING SYSTEM

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19 Claims. (Cl. 187—29)

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The invention relates to elevator systems in which a plurality of cars operate as a bank, and particularly to a dispatching system for an installation of such type for individually dispatching the cars at suitable intervals from a dispatching floor.

There have been many elevator dispatching systems suggested, and many are now in use, including the rotational dispatcher for a bank of cars, in which the cars are dispatched from a terminal floor in a predetermined invariable sequence, and the non-rotational dispatcher, in which the cars are dispatched from the terminal in the order of their arrival.

In both of these cases the dispatching signal is given to the operator at the expiration of a period of time after arrival at the dispatching floor depending upon estimated traffic conditions. However, for a given building traffic conditions do not remain constant throughout the day, and as a result there may be undesirable delays in answering calls for service under some conditions because the dispatching schedule is such that two or more cars of the bank may be at the dispatching terminal at the same time, thereby reducing the number of cars available for servicing the intermediate floors of the building.

In another type of dispatching system designed to improve this situation when more than one car is present at the dispatching terminal, the dispatching time, or interval, of the first car that arrived may be shortened upon the arrival of a second car, and even further shortened upon the arrival of a third car.

This type of system corrects the accumulation or "bunching" of cars at the terminal, but the correction is not effective until bunching, or the presence of two or more cars at the terminal, actually occurs. Of course with this system, under steady load conditions the cars of the system will become properly spaced, but with variations in loading there will be an undesirable time lag in the realignment of the dispatching schedule responsive to the resulting "bunching" of the cars, and the situation is worsened if the change in loading occurs suddenly.

In accordance with the present invention a dispatching system is provided in which the dispatching interval is varied continuously in accordance with the number of calls for service on the elevator system and rate of change in the number of calls for service. For example, where a bank of elevators has substantially equal up and down loading, which may be classed as heavy, which tapers off over a short period

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to a light loading and then increases to another period of heavy loading, the present invention will respond by first decreasing the dispatching interval to prevent cars bunching at the dispatching terminal during the light load period, and then increasing the interval again as the loading becomes heavy. The dispatching interval is kept continually in phase with the load demand as it changes, and in the event of a sudden change in the rate of loading by a predetermined amount the dispatch signal may be given substantially instantaneously.

It is, therefore, an object of the invention to provide a dispatching system in which the elevator cars of a bank are dispatched from a terminal, or dispatching floor, in a period of time after arrival which continuously varies in accordance with a number of calls for service registered on the system as well as the rate of change in the number of such registrations.

It is a further object of the invention to provide an elevator dispatcher which is responsive to the registered car calls and/or hall calls to continuously vary the dispatching interval in accordance with variations in the number of calls on the elevator system.

Other objects of the invention will be apparent from the following description and the accompanying drawing in which:

Figure 1 is a schematic view of an elevator system illustrative of the type to which the invention may be applied;

Fig. 2 is a schematic circuit in straight-line form of the dispatching system of the invention, and

Fig. 2A is a schematic key-sheet indicating the location of the relays and contacts of Fig. 2 when placed beside Fig. 2.

The invention, of course, is primarily applicable to banks of two or more elevator cars, although it may have some application to a single car. By way of illustration the invention will be described with respect to a bank of four cars, one of which is schematically illustrated in Fig. 1. As indicated in the circuit diagram, Fig. 2, the invention may be applied a bank of four cars designated as A, B, C and D.

Referring to Fig. 1, car A of the bank is suspended from one or more ropes or cables 2 which extend over a hoisting sheave 4 and are connected to a counterweight CWT. The hoisting sheave 4 is mounted upon the shaft of a motor 6, of any conventional type, having a usual electromagnetic brake 8. The motor 6 also drives a floor-selector mechanism FS which may be of

a conventional type having a plurality of fixed contacts 10 mounted in insulated relation and spaced in accordance with the spacing of the floors of the building, and a movable cross-head or carriage 12 having contact brushes 14 mounted on it for engaging the stationary contacts 10 as the cross head moves up and down the face of the selector in accordance with car movement, as governed by threaded shaft 16 driven from the motor 6 through suitable reduction gearing 18. A contact A20 is also on the selector at a position corresponding to the top terminal of the elevator shaft to be engaged by brush A22 when the car reaches that position. Similarly, contact A21 corresponds to the lower terminal, the position of the carriage 12 as shown corresponds to the car being at basement level.

The motor 6 may be controlled in any of a number of ways which are conventional, such as by a car switch CS to be manipulated by the operator in the car to start the car, and the car may be stopped automatically by car buttons CB mounted in the car, and push-button stations HB in the hall or corridor at each floor. Usually, of course, there is one car button corresponding to each floor of the building, and at each intermediate floor the push-button stations HB comprise an "up" button and a "down" button. The automatic stopping of the car in response to these buttons is so well known that a detailed description thereof is not considered necessary. Of course, the system may be such that the stopping is controlled manually by the car switch CS in response to signals to the operator effected by the push-buttons. The car-buttons upon being pressed will remain in circuit-closing position until the car stops at the designated floor or until the car completes its trip in a given direction, and the hall buttons upon being pressed energize call registering relays which remain in energized or contact-closed condition until the call is answered by the car.

The above-described apparatus for car A is duplicated for cars B, C and D, it being understood, of course, that for the group or bank of cars, only one set of hall buttons HB at each floor is required because cross-connections between the floor selectors of the four cars insure that the nearest car moving in the desired direction of travel will answer and cancel the hall call, in accordance with usual practice.

Referring to Fig. 2, the dispatching timer of the invention includes a variable speed motor M, the armature 30 of which is connected in a loop circuit with the armature 32 of a generator G which is driven by a constant speed alternating current motor 34. The motor M is provided with a separately energized field MF. The generator G is provided with a shunt field winding GF, the degree of excitation of which determines the output of the generator, and, accordingly, the speed of the timing motor 30. This is usually termed a variable-voltage or Ward-Leonard type of motor control system.

The generator G is mechanically connected through an electromagnetic clutch AC to a cam 40 which sequentially closes a plurality of pairs of contacts RA, RB, RC and RD. Suitable gearing 41 may be interposed between the clutch and cam to provide a desired rate of rotation of the cam.

The timing motor M is connected through a second electromagnetic clutch SC to timing cams 42 and 44 for a purpose to be described.

In the dispatching sequence a car upon selection as the next car to leave receives a "next" light ANL and after a time interval a "start" light ASL. These are shown in Fig. 1 as mounted in the car to indicate to the operator that his car is "next" and he can begin to receive passengers. Preferably a hall lantern AHL is lit at this time to signal to intending passengers that the car is available. When the operator receives the starting signal ASL he may proceed on his trip.

For the purposes of this description the dispatching floor will be considered to be the upper terminal, and the dispatching interval will be controlled by car and hall calls for service in the down direction.

If car A is the first to arrive adjacent to the terminal, and assuming that a car has just left the terminal as car A arrives, floor selector contacts A22 and A20 engage and relay AU will be energized (Fig. 2) and will remain energized so long as car A is at the terminal. With relay AU energized, contacts AU1 close which completes a circuit through the winding of clutch AC and the series of break contacts AN1 through DN1 thereby engaging the clutch AC and rotating selector cam 40, whose purpose is to select the next car to leave in the event that two or more cars should be at the dispatching floor at the same time.

Contacts AU2 also close preparing a circuit for "next" relay AN through break contacts AS2 and open contacts RA of the switch operated by cam 40. A circuit is also prepared for the "start" relay AS which is incomplete at this time by reason of the open contacts AN2 and ST3.

As the cam 40 advances, with a relatively rapid rotation which may be assumed to be one revolution per second, contactor RA will be closed and thereby complete the circuit to relay AN. The energization of relay AN opens contacts AN1 in the circuit of the winding of clutch AC, thereby stopping cam 40. It also closes contacts AN3 in circuit with the "next" light ANL and the hall lantern AHL for car A, and it closes contacts AN2 in the circuit of "start" relay AS.

With the winding of clutch SC energized through break contacts ST1 and the series of break contacts AS1 through DS1, cam switch S will be closed in a predetermined time depending upon the speed of the timing motor 30. With the closure of contacts of cam switch S, relay ST is energized. The relay picks up and establishes a holding circuit for itself through contacts ST2. At the same time break contacts ST1 open and deenergize the clutch SC, permitting the cam 42 to return to its starting position under the influence of spring 43.

Relay ST upon energization closes its contacts ST3 thereby completing the circuit to relay coil AS, the circuit comprising

L1—AU2—AS—AN2—ST3—L2

Relay AS closes its contacts AS4 to energize the start signal ASL. It also closes contacts AS3 which establish a holding circuit for itself. Contacts AS1 will open, breaking the circuit to the relay winding ST and the clutch winding SC. Contacts AS4, in addition to energizing the start signal ASL, may also be effective to control a circuit for starting the car, as indicated, in the event that the elevators are of the automatic push-button type.

As the car leaves the terminal in response to the starting signal, the engagement of the floor selector contacts A20 and A22 is broken and the system is ready to respond to the next car at the

terminal, assuming that cars B, C or D arrived during the above described dispatching sequence for car A. In that case selector contacts B20—B22, or C20—C22, or D20—D22 will be in engagement and the respective relays BU, CU or DU will pick up and the above described "next" and "start" sequence will be repeated.

Of course, while car A is waiting for its start signal after receiving its "next" signal, the arrival of subsequent cars do not affect the dispatch operation of car A because even though the relays BU, CU or DU become energized and close their contacts BU1, etc. the circuit through clutch winding AC is broken by contacts AN1 which do not reclose until AN is deenergized by the pickup of "start" relay AS of car A which opens its contacts AS2.

Assuming further that there are no cars at the terminal, that is, none of the relays AU through DU are energized, the winding of clutch SC is energized (ST1 being closed) and upon rotation of cam 42 switch S will close. Relay ST will then be energized and hold-in through its contacts ST2. Clutch winding SC will be deenergized by the opening of ST1 and cam 42 will be returned to its starting position by spring 43. The contacts ST3 in the circuit of "start" relays AS to DS will close, so that upon the arrival of the next car, such as B for example, and which is presumably late, it will receive the "next signal" as soon as cam 40 closes RB which energizes BN which in turn energizes BS. The "next" and "start" signals are then given at substantially the same time.

Throughout the foregoing, it has been assumed that field winding GF of generator G has been energized to any required degree for operating the timing motor M. However such energization in accordance with the invention will be varied in proportion to the number of calls for service on the system, and the rate of registration of said calls.

For example, in Fig. 2 the field winding GF may be energized through four parallel resistance circuits *a*, *b*, *c* and *d* corresponding to the four cars A, B, C and D. Each resistance circuit is divided into equal sections corresponding to the number of floors to be served in response to the car buttons CB, and the floors to be served in response to "down" hall buttons at the floors. Assuming a building of twenty floors, there will be twenty resistor sections corresponding to the number of car buttons and nineteen sections corresponding to the number of "down" hall buttons. The resistor sections are normally shunted, when there are no calls on the system, by break contacts to be operated by the car buttons 1CB through 20CB, and break contacts 2DR through 19DR on the "down" call registering relays (not shown) which operate in response to the "down" hall buttons, and are held in operated condition until a car answers the call.

A fixed resistor 50 is in series with each of the resistance circuits *a*, *b*, *c* and *d* to provide a desired minimum value, and contacts 52 are provided in each branch and are closed when the respective cars are placed in service. The four resistance circuits are connected in parallel through a series resistance 54 to the generator shunt field winding GF. The resistor 54 is shunted by break contacts 1D2 for a purpose described hereinafter.

By way of example and not limitation, the fixed resistors 50 may be of the order of 60 ohms, and each of the segments of the resistance circuits *a*, *b*, *c* and *d* may be 20 ohms.

Assuming that car A is the only car in service, if there are no registered calls on the system, resistance *a* will be shunted by the closed contacts of car buttons CB and the DR contacts of the hall call storing relays. The only resistance in circuit with the field winding GF will be represented by fixed resistors 50 and 54. This will afford a relatively high energization of GF and accordingly, a relatively high speed of the timer motor M. When passengers enter car A and car buttons are pressed indicating the desired destination floors, corresponding sections of resistance *a* are placed in the circuit of GF, and as down floor-calls are registered corresponding contacts DR will open thereby cutting in more resistance to further decrease the energization of GF and accordingly increase the timer interval to correspond to an expected longer through-trip time of the car.

If car B is placed in service, closing its contacts 52, its DR contacts corresponding to the hall calls registered will also open, and car button contacts corresponding to the desires of passengers entering car B will open. With the two resistance paths *a* and *b* in parallel, GF will be energized to a higher degree thereby increasing the speed of motor M and decreasing the timer interval. Similarly, as cars C and D are brought into service, the additional resistors *c* and *d* become effective, the hall calls on the system being common to all the cars, and car halls being effective to modify the resistor associated only with the car in which they are registered.

From the foregoing it is apparent that the speed of the dispatcher motor M, and hence the length of the dispatching interval, is a continually varying quantity depending upon the number of car calls and hall calls registered at any given instant. That is, with a steady balanced loading of calls, an interval of 30 seconds for dispatching cars from the top terminal may be adequate. However, if the loading decreases, thereby decreasing the round-trip time of the cars, the cars may start to bunch or accumulate at the dispatching terminal unless the dispatch interval is shortened. This is automatically taken care of in the present system because as the number of calls decrease, fewer of the DR contacts will be open and hence the energization of the generator field GF will increase. The reverse is true of course for an increase of loading on the system resulting in an increased round-trip time, making a longer dispatch interval desirable to insure a proper distribution of the cars.

Also as cars are taken out of service, or brought into service, opening or closing the respective contacts 52, the dispatch interval will automatically vary to adapt the cars in service to the loading on the system at that time.

At the lower part of Fig. 2 is shown a circuit which is responsive to the rate of change in the registration of calls, in this case down hall-calls for example, including a capacitor 60, relays 1D and 2D, sectionalized resistors 62 and 64, and fixed resistors 66 and 68.

The capacitor 60, which may be of the order of 300 or 400 microfarads capacity, is connected in series with the windings of relays 1D and 2D in a circuit connected between the junction of resistors 62—66 and 64—68.

The segments of resistor 62 are provided with shunts including the normally open contacts 2DR1 through 19DR1 of down call registering relays (not shown) which are operated in re-

sponse to the registration of calls for service at the second through tenth floors.

Similarly, the segments of resistor 64 are shunted by circuits including the normally open contacts 11DR1 through 19DR1 corresponding to the call storing relays for the eleventh through nineteenth floors.

The relays 1D and 2D are of the instrument-type operating upon a fraction of a watt, and are polarized so that they are responsive to the direction of current flow through their windings. Relay 1D is set to operate at a lower current than 2D.

Relay 1D in operation closes its contacts 1D1 in a circuit which shunts the resistance circuits *a*, *b*, *c* and *d*, and open its contacts 1D2 which are in shunt circuit for the resistor 54 in series with the generator field winding GF. Relay 2D upon energization closes its contacts 2D1 which are in circuit with contactor S' controlled by the cam wheel 44 of the timer.

Assuming that there are no calls on the system and the contacts 2DR1 through 19DR1 are open as shown, the condenser 60 will be charged from L1, resistor 68, condenser 60, relay windings 1D and 2D, resistor 66 and L2, because the total resistance of the sectionalized resistors is substantially larger than that of the fixed resistors 66 and 68. The relay side of the condenser 60 will therefore be charged negatively, and no current will be flowing through the relay circuit because it is assumed that the condition existed long enough to have charged the condenser.

As down-calls are registered, corresponding segments of the resistors 62 and 64 will be shunted by the DR1 contacts, thereby decreasing the total values of these resistors. If we assume an extreme case, by way of example, where suddenly from a period of no down-calls on a system there are suddenly registered fifteen down-calls, the values of resistances 62 and 64 will decrease to a point where the current through the condenser will reverse in direction, namely from L1 through the few remaining segments of resistor 62, the relay windings 2D, 1D and condenser 60 through the remaining segments of resistor 64 to L2.

Under this extreme condition, there would be sufficient current flowing through the directional relay windings 1D and 2D to operate both of them. The complete charging of the condenser 60 will of course be delayed in accordance with the resistance remaining in the circuit.

The operation of 1D, closing 1D1, speeds up the dispatcher timer by increasing the energization of shunt field GF to dispatch a car from the terminal sooner than the car otherwise would be dispatched. At this point the normally closed contacts 1D2 do not open.

The operation of relay 2D closes 2D1 to energize relay ST to give a start signal immediately to a car at the terminal provided that a minimum interval has elapsed since the last start signal has been given, which is determined by contact S' operated by cam wheel 44. That is, if a car is present at the top terminal, it will receive an immediate dispatch signal assuming that S' is closed, but if no car is there, the signal will be stored until a car does arrive because relay ST will remain energized through its holding contacts ST2 and upon the arrival of the car the car will immediately receive its "next" and "start" signals.

In the operation just described the operation of relay 1D is of no great consequence because of the simultaneous operation of relay 2D. However, if there are a smaller number of down calls, than the fifteen assumed above, there will be a smaller current flow through the relays 1D and 2D which may not be sufficient to operate relay 2D, and an immediate start signal will therefore not be available. However, there may be sufficient current to operate the more sensitive relay 1D for a time, and speed up the dispatcher by closing contacts 1D1 which shunt the resistor circuits *a*, *b*, *c* and *d*. Therefore, a smaller increase in down hall-calls causing sufficient current to flow to operate relay 1D only, will effect a speeding up of the dispatcher signal which will move cars from the upper terminal more rapidly to take care of the increase in down calls.

When the increase of down calls is satisfied, resulting in many or most of the DR1 contacts opening, the current through the condenser will again reverse, making the relay side negative, causing a reversal in the current flow through the relay coils. The reversal will have no effect upon relay D2 but it will cause relay D1 to open contacts 1D2, and will leave contacts 1D1 normally open. The normally closed contacts 1D2, when open, remove the shunt around resistor 54 in series with the field GF which will lengthen the dispatching interval.

If desired, this contact 1D2 may be employed to speed up the dispatcher at the opposite terminal to decrease the dispatching interval at that point and thereby speed the dispatch of cars in the up direction. That is, although the foregoing description has been specific to dispatching from the top terminal in connection with "down" calls for service, it may be desirable to have a bottom floor dispatcher in connection with "up" calls. Such an "up" dispatcher would be substantially in accordance with Fig. 2 except that segmental resistors *a*, *b*, *c* and *d* would be controlled by contacts on the call registering relays DU which are controlled by the "up" corridor push buttons.

On the other hand, the requirements of a given installation may render it more expedient to dispatch from the bottom floor only, omitting the top floor dispatcher.

Further, it may be expedient to control either or both top and bottom dispatchers in accordance with car button calls only, in a situation where up or down corridor calls are infrequent, or if most of the passengers collected in response to corridor calls normally desire to proceed to one terminal or the other, the dispatcher may be controlled entirely by the number and rate of registration of corridor calls.

Quite obviously many aspects and modifications of the system disclosed will present themselves and it is intended that the invention be limited only by spirit and scope of the appended claims.

I claim as my invention:

1. In an elevator system including a bank of cars for serving a plurality of floors and provided with means for registering calls for service for said floors; means for individually dispatching said cars from one of said floors at periodic intervals including a timing device and means controlled thereby for giving a dispatch signal to said cars, and means for varying the operation of said timing device to vary the interval between dispatch signals in accordance with the number of registered calls for service on said system and the rate of registration of said calls.

2. In an elevator system including a bank of cars for serving a plurality of floors and provided with means for registering calls for service

for said floors; means for individually dispatching said cars from one of said floors at periodic intervals including a timing device and means controlled thereby for giving a dispatch signal to said cars, and means for varying the operation of said timing device to vary the interval between dispatch signals in accordance with the number of registered calls for service on said system, and means for further varying the operation of said timing device in response to a rate of registration of said calls above a predetermined amount for decreasing the interval as determined by said last named means.

3. In an elevator system including a bank of cars for serving a plurality of floors and provided with means for registering calls for service for said floors; means for individually dispatching said cars from one of said floors at periodic intervals including a timing device and means controlled thereby for giving a dispatch signal to said cars, and means for varying the operation of said timing device to vary the interval between dispatch signals in accordance with the number of registered calls for service on said system, and means responsive to a rate of registration of said calls above a predetermined amount for giving a dispatch signal substantially instantaneously.

4. In an elevator system including a plurality of cars serving a plurality of floors and means for registering calls for service by the cars with respect to the floors, one of said floors being a dispatching floor, means for sequentially dispatching the cars from the dispatching floor at continuously variable intervals comprising a variable speed voltage responsive timing device, and means for energizing it at a variable voltage continuously proportional in magnitude to the number of registered calls for service on said system.

5. In an elevator system including a plurality of cars serving a plurality of floors and means for registering calls for service by the cars with respect to the floors, one of said floors being a dispatching floor, means for sequentially dispatching the cars from the dispatching floor at continuously variable intervals comprising a variable speed electric timing motor, an electric generator having its armature connected in a loop circuit with the armature of said motor and a separately excited shunt field winding, means for exciting said winding including means for varying the excitation thereof in accordance with the number of registered calls on said system.

6. In an elevator system including a plurality of cars serving a plurality of floors and means for registering calls for service by the cars with respect to the floors, one of said floors being a dispatching floor, means for sequentially dispatching the cars from the dispatching floor with a continuously variable time delay comprising a variable speed electric timing motor, an electric generator having its armature connected in a loop circuit with the armature of said motor and a separately excited shunt field winding, means for exciting said winding comprising means for varying the excitation thereof in accordance with the number of registered calls on said system and the duration of such calls.

7. In an elevator system including a plurality of cars serving a plurality of floors and means for registering calls for service by the cars with respect to the floors, one of said floors being a dispatching floor, means for sequentially dispatching the cars from the dispatching floor

with a continuously variable time delay comprising a variable speed electric timing motor, an electric generator having its armature connected in a loop circuit with the armature of said motor and a separately excited shunt field winding, means for exciting said winding comprising means for varying the excitation thereof in accordance with the number of registered calls on said system and means responsive to the rate of registration of such calls for further varying the energization of said winding.

8. In an elevator system including a plurality of cars serving a plurality of floors and means for registering calls for service by the cars with respect to the floors, one of said floors being a dispatching floor, means for sequentially dispatching the cars from the dispatching floor with a continuously variable time delay after arrival thereof at such floor comprising a variable speed electric timing motor, an electric generator having its armature connected in a loop circuit with the armature of said motor and a separately excited shunt field winding, means for exciting said winding comprising means for varying the excitation thereof in accordance with the number of registered calls on said system and the duration of such calls and means responsive to the rate of registration of such calls for further varying the energization of said winding.

9. In an elevator system including a plurality of cars serving a plurality of floors and call means at said floors for registering calls for service in the down direction and call means in each car for each floor served thereby, means for dispatching said cars in sequence from an upper floor comprising a dispatching signal and an electric timing motor for effecting the energization thereof, means for automatically and continuously varying the speed of such motor including a constant speed electric generator electrically connected thereto and having a separately excited field winding, means for variably exciting said winding including a plurality of sectionalized resistors, one corresponding to each car, and means connecting them in parallel circuit relation with each other and all in series circuit relation with said winding and a source of voltage, separate shunt cicrcuits for the sections of said resistor each including a normally closed contact, such contacts to be opened in response to the operation of said call registering means to vary the resistance of the circuit of said winding.

10. In an elevator installation including a bank of cars serving a plurality of floors and means at each of said floors for registering a call for service by the cars for that floor; a system for dispatching said cars from one of said floors including means for selecting a car at that floor to be the next to be dispatched, a dispatch signal, and means for energizing said signal for the car so selected after a time interval of variable duration depending upon the number of unanswered registered calls for service on the bank of cars.

11. In an elevator system in which a plurality of cars are sequentially dispatched from one floor to serve a plurality of other floors and in which means are provided for registering calls for service to said floors by said cars, means at said one floor for giving periodic dispatch signals, means for continuously varying the period between dispatching signals in accordance with the number of registered calls for service on said system, and means for further varying such period in re-

sponse to the rate of change in the number of calls registered.

12. In an elevator system in which a plurality of cars are sequentially dispatched from one floor to serve a plurality of other floors and in which means are provided for registering calls for service to said floors by said cars, means at said one floor for giving periodic dispatch signals, means for continuously varying the period between dispatching signals comprising a voltage responsive timing device, a source of variable voltage therefor, and means for continuously varying the voltage of said source in accordance with the number of registered calls for service on the elevator system.

13. In an elevator system in which a plurality of cars are sequentially dispatched from one floor to serve a plurality of other floors and in which means are provided for registering calls for service to said floors by said cars, means at said one floor for giving periodic dispatch signals, means for continuously varying the period between dispatching signals in accordance with the number of registered calls for service on said system, and means for further varying such period in response to the rate of change in the number of calls registered, and additional means responsive to the rate of registration of said calls for further varying the voltage of said source.

14. In an elevator system in which a plurality of cars serve a plurality of floors and which are provided with means responsive to calls for service registered by push-buttons at said floors and push-buttons in each car corresponding to the floors served thereby; means for dispatching said cars sequentially from one of said floors comprising selecting means for determining the next car to be dispatched, a dispatching signal and means operable with a time delay for energizing said signal for a car so selected, said last named means including timing mechanism and means for varying continuously the timing operation thereof in accordance with the number of calls for service registered on the elevator system by said push-buttons.

15. In an elevator system including a plurality of cars serving a plurality of floors and which are provided with means responsive to calls for service registered by switches at said floors and switches in each car corresponding to the floors served thereby, means for dispatching said cars sequentially from one of said floors comprising selecting means for determining the next car to be dispatched therefrom, a dispatch signal and means operable with a time delay for energizing said signal for a car so selected, said last named means including a variable speed electric timing motor, a variable-voltage generator for energizing said motor, and means for exciting said generator with a voltage continuously variable in magnitude in proportion to the number and duration of calls registered by said push-buttons in said cars.

16. In an elevator system including a plurality of cars serving a plurality of floors and call registering means at each floor for registering calls for service in one direction of travel with respect to a dispatching floor, and means for sequentially dispatching said cars from said floor including a dispatch signal in each car, a variable speed timing device and a contactor operated thereby for energizing said signals, means for varying the speed of said timing device in accordance with the number and duration of calls registered, and means responsive to an increase in the rate of registration of said calls above a predetermined amount for increasing the speed of said timing motor, and means responsive to a further increase in the rate of registration for energizing the dispatching signal for a car at the dispatching floor substantially instantaneously.

17. In an elevator system including a plurality of cars serving a plurality of floors and call registering means in each car for registering calls for service in the direction of travel of the car toward a dispatching floor, and dispatching means at such floor for dispatching cars therefrom in sequential intervals including a timing device, and means for varying continuously the operation of said device in accordance with the number of calls registered on said call registering means.

18. In an elevator system including a plurality of cars serving a plurality of floors and call registering means at each floor for registering calls for service by such cars and means for sequentially dispatching said cars from one of said floors including a dispatch signal for each car, a variable speed timing device and contactor operated thereby for energizing said signals, means for varying the speed of said timing device in accordance with the number and duration of calls registered, and means responsive to the rate at which said calls are registered to increase or decrease the speed of said timing motor as such rate of registration increases or decreases a predetermined amount.

19. In an elevator system in which a plurality of cars serve a plurality of floors and which are individually provided with stopping means responsive to calls for service registered by push-buttons at said floors and push-buttons in each car corresponding to the floors served thereby, means for dispatching said cars sequentially from one of said floors comprising selecting means for determining the next car to be dispatched, a starting signal and means operable with a time delay for energizing said signal, said last named means including a variable speed electric timing motor, a variable-voltage generator for energizing said motor, and means for exciting said generator with a voltage continuously variable in magnitude in accordance with the number and duration of calls for service registered by said push-buttons at said floors.

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No references cited.