

UNITED STATES PATENT OFFICE

FRANZ A. BOEDTCHER, OF BERGENFIELD, NEW JERSEY, ASSIGNOR TO OTIS ELEVATOR COMPANY, OF JERSEY CITY, NEW JERSEY, A CORPORATION OF NEW JERSEY

SERVICE INDICATING SYSTEM FOR ELEVATORS

Application filed June 26, 1925. Serial No. 39,670.

This invention relates, generally speaking, to systems for controlling the operation of the several cars of a bank of elevators in accordance with a predetermined time schedule.

5 The operation of cars on schedule is particularly desirable in large office buildings and hotels where a large number of elevators are constantly in operation. In such instances, service demands that cars leave the ground floor at substantially uniform intervals, for example every thirty seconds. If
10 such schedule is maintained, crowds will not congregate at any of the floors of the building and the service will proceed smoothly and without interruption or crowding of cars.

15 The need of service of this character has long been apparent and numerous expedients have been resorted to in an attempt to accomplish this end. For example, installations
20 have been made which include a bell or light at the ground floor of each elevator shaft and these bells or lights have been controlled by clockwork, so that the bells or lights are operated in the desired sequence and in
25 proper timed relation. That is to say, the successive bells or lights are operated at half minute intervals, with a view to dispatching the cars in succession at such intervals.

30 With systems of this character, however, it is found, in practice, that when the time arrives for a particular car to be dispatched, the car is often so far behind schedule that it has not yet arrived at the ground floor and service is thus delayed. Other systems for
35 maintaining schedules have been attempted, but none of them have been found efficient in maintaining the schedule, and, as a general rule, certain cars are running ahead of and behind schedule at all times.

40 With these considerations in mind, the object of the present invention is to provide a system wherein the schedule for the operation of a plurality of cars may be accurately followed and in order to accomplish this, the
45 present invention provides means whereby the operator of each car will know at all times whether his car is on time at any floor or whether he is behind or ahead of time at such a floor and how much. This enables the car
50 operators to strictly adhere to schedule and

makes it possible to obtain elevator operation at the desired intervals.

Speaking generally, the invention consists, in a broad sense, in providing within each car, indicating means which will accurately
55 show, not only the position of a car at all times, but will simultaneously show, in a convenient position for comparison, the position in which the car should be at the same time if the time schedule is to be followed. 60 As a result of this arrangement, which, in practice, may be carried out by different mechanism, the operator is enabled to preserve a strict adherence to the predetermined schedule and service will be maintained at
65 maximum efficiency.

In one of its practical forms, the invention consists in positioning within the elevator car a series of lamps which correspond
70 to the several floors of the building and wiring these lamps, so that, as the car moves in its shaft, the lamps will successively light up as the car passes the successive floors, so that at a glance, the operator may know the exact position of his car. In its preferred
75 form of the invention, the same lamps are also wired up to suitable selective mechanism which is time controlled and is operated at a predetermined speed to light the lamps in succession and in the timed sequence
80 which they should be illuminated if the car were travelling at the speed required to keep up the schedule. In this form of the invention, a suitable resistance is included in this
85 latter wiring, so that the lamps will glow with less brilliancy when thus operated than when operated directly by the movement of the car. Thus, as the operator looks at the
lamps, he may see one with a bright glow and another with a dim glow. He will know
90 immediately upon discerning this that his car is not on schedule and can speed up or slow down the car or wait at a floor until his running time is coordinated with the schedule time. 95

In the preferred form of the invention, one series of lamps is used as described, but the invention is manifestly not limited in this connection, since the lamps which show the correct schedule may be different from the 100

lamps which show the position of the elevator or in lieu of lamps, other comparative indicating means may be employed without departing from this invention.

5 Features of the invention, other than those specified, will be apparent from the hereinafter detailed description and claims, when read in conjunction with the accompanying drawing.

10 The accompanying drawing illustrates one practical embodiment of the invention, but the construction therein shown is to be understood as illustrative, only, and not as defining the limits of the invention.

15 Figure 1 is a diagrammatic showing illustrating the present invention and including a wiring diagram of the preferred form of the invention; and

20 Figure 2 is another diagrammatic view showing the manner in which the time controlled commutator is operated.

Referring to the drawing, 10 designates an annunciator housing positioned in an elevator car and constituting a housing for a plurality of lamps designated 1 to 6, inclusive, and two additional lamps designated G and T. The lamp G is the starting lamp for the ground floor, the lamp T, the starting lamp for the top floor and the lamps 1 to 6 correspond to the several floors of a six story building. I have shown lamps as signals in this connection, although bells may be used at G and T, if desired. 10a is another annunciator housing positioned anywhere that it is desired to show a duplication of the signals given in the car. Thus, this housing 10a may be placed where the starter can readily see it or it may be positioned in the office of the superintendent of the building, or, if desired, the housing 10a may be duplicated in these several positions.

In any event, the housing 10a contains to all intents and purposes the same kind of signals or indicators as the housing 10, and they bear the same reference characters with the exponent a. Thus Ga of the housing 10a corresponds to G of the housing 10, etc.

25 The corresponding signals or indicators of the housings 10 and 10a are electrically connected in multiple or series as may be desired, but are shown in the drawing as wired in multiple. If, additional signal housings are desired, they will be connected in like manner. The purpose of this arrangement is to show exteriorly of the car in as many places as it is wanted, the same signals or indications as are being shown in the car.

Mounted in any suitable position, so as to be operated in synchronism with the movements of the car, is a selective device 11, shown for the purpose of illustration as a commutator. This selective device may be of any suitable construction and may be operated from one of the elevator sheaves or from 30 any other suitable element which moves in

synchronism with the car. For the purpose of illustration, the commutator 11 is shown as provided with a moving contact 12 bearing at all times against a continuous strip 13 and adapted to traverse six fixed contacts, designated 13 to 18 inclusive. These several fixed contacts correspond to the six floors of a building installation and of course this number of contacts will vary for buildings having a different number of floors.

70 The reference character 14 designates another commutator which may also be of any suitable form, but is operated in a manner entirely independent from the travel of the elevator, and is preferably controlled so as to operate in accordance with a predetermined schedule of time. The type of commutator used in this connection from a structural standpoint is immaterial so long as it is constructed to carry out the closing of certain circuits in predetermined timed sequence. As shown the commutator 14 embodies a relatively long fixed contact 15 in spaced relation to each end of which are two additional fixed contacts 16 and 17. The contacts 16, 15 and 17 form, collectively, one set of contacts of this commutator. The other set of contacts include two fixed terminal contacts 18 and 19 which correspond in length and position to the contacts 16 and 17, together with the intermediate contacts designated 1c to 6c inclusive.

It will be noted that an additional short contact 20 is positioned between the contact 18 and the contact 1c and that another short contact 21 is positioned between 6c and 19, the purpose of these two latter contacts will be presently explained. The movable contact or brush 22 is mounted to traverse the several fixed contacts in succession for the purpose of bridging said contacts as will be presently explained.

An important feature of the commutator 14 resides in the fact that the movement of the brush 22 is time controlled; that is to say, it is moved at a predetermined speed into successive engagement with the several pairs of contacts which it is adapted to successively bridge. Suitable mechanical means may be provided to cause the brush to accomplish this movement in a manner wholly independent of the movement of the associated elevator car, and in the drawing one form of mechanism, though obviously not the exclusive one, is shown for the purpose of illustration.

In this showing, 23 designates a power shaft driven at a constant speed, preferably from an electric motor through reducing gearing, and mounted upon this shaft is a friction wheel 24. The friction wheel bears against a friction disk 25 and said wheel 24 is adjustable radially of the disk, so that the speed of the disk with reference to the shaft may be varied to suit conditions. The disk 130

is affixed to a shaft 26 which is journaled in a suitable bearing 27 and carries a drive disk 28. This drive disk is slotted radially as shown at 29 and mounted in the slot for radial adjustment therein is a drive pin 30. The drive pin may be adjusted to the desired position longitudinally of the slot 29 and thereafter locked in position.

The operating shank 31 is associated with the brush 22 and this operating shank is secured to the pin 30 by means of a connecting rod or link 32, so that as the friction disk 25 is operated and the drive disk 28 rotated, the brush 22 is reciprocated over the contacts. The throw of the connecting rod can of course be controlled by adjusting the position of the connecting pin 30 within the slot of the disk, but, if desired, the connecting rod 32 may have an additional adjustment to provide for the lengthening or shortening of such rod. The same may be accomplished including a turn buckle 33 in the connecting rod, as shown in Figure 2, or in any other suitable manner so as to vary the distance between the brush and the pin 30. The reasons for these adjustments will be hereinafter more fully explained in connection with the operation of the system.

In Figure 2, the commutator 14 is shown in elevation and a spring 34 is shown as reacting against the guide strip 35 to force the brush 22 at all times into engagement with the segments or contacts of the commutator, so that good electrical engagement is effected.

The wiring of the system will now be described.

36 designates any suitable source of electrical energy capable of actuating signals or indicators. From this source extend two mains 37 and 38. The main 37 has several branches, designated 39, 40, 41 and 42. The branch 39 connects with the long contact 13 of the commutator 11. The branches 40 and 42 connect respectively to the terminal contacts 17 and 16 of the commutator 14 and the branch 41 connects to the long strip 15 of the commutator 14. In the branch 41 is preferably included a suitable resistance 43.

The main 38 is provided with branches 44 and 45 which are, in turn, branched to connect all of the indicators contained in the housings 10 and 10a. In other words, the main 38 serves as a common feed for all of the indicators through its two branches 44 and 45, as will be clearly apparent from Figure 1.

It will be also noted from Figure 1 that the short segments 1b to 6b inclusive of the commutator 11 are connected to the corresponding short commutator sections 1c to 6c, inclusive, of the commutator 14 through wires 1d, 2d, 3d, 4d, 5d and 6d and it will be further apparent that each of the indicators 1 to 6 of the housing 10, as well as the indicators 1a to 6a of the housing 10a, are connected to the wires 1d to 6d by wires 1e, 2e, 3e, 4e, 5e

and 6e. In other words, the corresponding elements of each of the commutators and indicators are connected to one another, so that the corresponding indicators are in series with each of the commutators while the commutators are in multiple or parallel with reference to the mains 37 and 38. With this construction, it is manifest that the indicators are responsive to both commutators acting independently, so that one commutator may serve to operate one indicator while the other commutator is serving to energize a different indicator. It will also be noted that the indicators G and Ga are both connected by a common lead Ge to the contact 18 of the commutator 14, while both indicators T and Ta are connected by a common lead Te to the contact 19 of said commutator. The indicators G and Ga, T and Ta may also be connected to additional segments on the commutator 11, but, in practice, this is not essential and has been omitted in the showing of the drawing.

With the wiring which has been described, and the parts functioning as specified, the system will operate in practice in the following manner.

The shaft 23 may be considered as a prime mover operating at a constant speed. The friction wheel 24 will drive the disk 25 which through the shaft 26 will operate the drive disk 28 and this disk will rotate at a constant speed. As the drive disk rotates, it will act through the connecting rod 32 to reciprocate the brush 22 and cause said brush to traverse the several contacts of the commutator 14 at the predetermined speed appropriate to the desired service conditions.

While the commutator 14 is operated in this manner by purely mechanical means and at a predetermined speed, the commutator 11 is operated in synchronism with the car and the brush 12 of said commutator traverses the several contacts in succession and in a direction corresponding to the direction of movement of the car. We will assume for the purpose of illustration that the car is moving down and is at the second floor. The brush 12 is therefore bridging the contacts 13 and 2b and a circuit is thereby established from the main 37 through the branch 39 to contact 13, thence through brush 12 to contact 2b and through wires 2d and 2e to the indicators 2 and 2a and thence by return lines 44 and 45 to the return main 38. Thus while the car is at or passing the second floor, the indicators 2 and 2a will be in operation and the car operator can see at a glance the position of his car without watching the floor numbers which are usually marked on the shaft walls.

At the same time the commutator 14 is operating in accordance with the schedule that should be maintained and it will be assumed for the purpose of illustration that the particular car which is being described is be-

hind schedule and that at the instant under consideration, the car should actually be at the ground floor. Accordingly, the brush 22 will be bridging the contacts 16 and 18. As a result, a circuit will be established from the main 37 through the branch 42 to contact 16, thence through the brush 22 to contact 18 and through wire Ge to both the contacts G and Ga and thence through the return leads 44 and 45 to the return main 38. In this case G and Ga will thus be in operation and the operator will be notified of this operation either visibly or audibly depending upon the type of indicator used in this connection. The operator will thus know at once that although he is at the second floor he should be at the ground floor and will immediately speed up his car to make up for lost time.

Now, if it be assumed that when the car is at the second floor, it is on schedule, the commutator brush 22 will bridge the contacts 15 and 2c, so that current will be fed through both the commutators 11 and 14 to the indicators 2 and 2a. The operator will see only the one signal and will know at a glance that he is operating according to schedule. For another example of operating conditions, let it be assumed that the car is one floor behind schedule and that the brush 22 is bridging the contacts 15 and 1c. Such being the case, the indicators 2 and 2a will show the position of the car, while indicators 1 and 1a will be energized through a circuit including the branch 41 and resistance 43. By virtue of the presence of the resistance 43 in this circuit, the lamps 1 and 1a will glow with a lesser degree of illumination, i. e., they will appear dull. By pre-arrangement, the operator will understand that the dull glow shows the position in which his car should be and will know that he is one floor behind schedule and should speed up to make up for lost time. At all times when the car is on schedule, only one lamp or indicator in the car will be illuminated and it will be the duty of the operator to attempt to maintain this condition throughout the periods of operation of his car.

It will be noted that the contacts 16 and 18 which correspond to the position of the car at the base of the shaft, as well as the contacts 17 and 19 which correspond to the position of the car at the top of the shaft are longer than the intermediate shorter contacts 1c-6c. The reason for this difference in size is to permit of a longer period of rest or dwell of the car at the termini of its travel than at the several floors, and inasmuch as such rest or dwell should ordinarily be longer at the bottom of the shaft, the contacts 16 and 18 are both longer than the contacts 17 and 19.

If it be desired to shorten the periods of dwell at both the top and bottom of the shaft this may be accomplished in the construction shown by adjusting the drive pin 30 in its

slot 29 to decrease the throw of the connecting rod and if it is desired to increase the period of dwell at both the top and bottom of the shaft, the throw of the connecting rod is increased. If, on the other hand, it is desired to shorten the period of dwell at the top of the shaft and correspondingly lengthen the period of dwell at the bottom of the shaft the turn buckle 33 is manipulated to shorten the connecting rod 32, while a lengthening of the connecting rod will reverse these conditions. The actual elapsed time for travel of the elevator in accordance with the predetermined schedule is of course controlled by the position of the drive wheel 24 with reference to the shaft 26. To speed up the schedule, the wheel 24 is moved closer to the shaft 26 and to slow down the schedule the wheel 24 is moved further away from the shaft. To allow for this the wheel 24 is mounted for axial adjustment by any suitable mechanism which I have not considered it necessary to illustrate.

The regulation or adjustment of the parts to obtain the desired schedule are thus very flexible so that the exact indication of the service desired can be obtained.

I have thus far described the invention as complete for one elevator car or cage and in the preferred manner of carrying out the invention, each car has its own self contained system and may, if desired, be controlled from its own particular prime mover. In order, however, that the operations of the several cars may be properly synchronized, it is preferable that the drive disks of the several cars be driven from the same prime mover and in Figure 1 of the drawing, such an arrangement is illustrated. In this showing, the drive disk 28 is provided with a toothed periphery with which meshes a pinion 46. Rigid with the pinion 46 is a second pinion 47 which meshes with a gear 48 fixed on the shaft 49 which is coaxial with the shaft 26. On the shaft 49 is fixed a drive disk 50 of a second car and this drive disk may have a toothed periphery serving to drive the drive disk of the next car through similar connections to those just described.

It will be noted that the pinions 46 and 47 are mounted on a shaft 51 and said pinions are adapted to be shifted longitudinally of this shaft for the purpose of simultaneously disengaging the pinions from both the drive disk 28 and gear 48 in order that the proper relationship may be established between the systems of the two cars. The reason for providing for a shifting of relationship is to permit an elevator to be cut out or added to the bank of cars with the desired readjustment of the parts to give a uniform schedule. For example, if there are ten cars in the bank with service at the ground floor at thirty second intervals, the cars should be run at such speed that the first car will have completed a

trip and be ready to start on its next trip 30 seconds after the tenth car has left the ground floor for its first trip. Now, if the conditions of service are such that five cars will give the necessary service, the five remaining cars 5 may be discontinued temporarily in which instance the five cars left in service should be so coordinated that their systems will properly interlock to give substantially uniform intervals of service at the ground floor.

10 I am aware that the means for interlocking the several cars for proper coordination of the signals may greatly vary from the simple mechanism shown, but this mechanism is considered as fully sufficient from the stand- 15 point of concrete illustration.

Moreover, I have not attempted to show all the variations and adjustments of which the present invention is susceptible. For ex- 20 ample, it will of course be apparent that instead of adjusting the length of the connecting rod 32 to vary the zone of overall travel of the brush 22, any suitable equivalent construction can be used, but I have simply 25 shown in the drawing the best mode in which I have contemplated applying the principle of my invention.

It is sometimes desirable in elevator operation to limit the travel of a cage to only a 30 portion of the height of the shaft. For example, in a twenty story building, it may be desirable that certain cages operate only to the tenth floor. In such a case, the tenth floor would constitute the upper terminal of the 35 travel for that particular cage and the down starting signal for that cage should be operated, so that the cage will start down from the tenth floor and will receive such starting signal while at the tenth floor. This can be 40 readily provided for in the system of this invention by providing an extra brush 22' directly adjacent the brush 22 and by providing additional contacts 17' and 19' for cooperation with this brush. These two con- 45 tacts 17' and 19' may be placed at the desired points, so that the terminal floor can be determined thereby. Current is fed to the contact 17' through a connection 17² including a suitable switch while current is fed to the 50 contact 19' through a similar connection 19² which also includes a switch. When the travel of the cage for the full height of the shaft is desired, these switches will manifestly be left open, but if a lesser travel is de- 55 sired, the switches will be closed and the contacts 17' and 19' adjusted to correspond to the desired floor.

There may be times when it is desirable to entirely cut out the system for one cage and 60 for this purpose a switch 52 is shown as included in the main 37. By opening this switch, the entire system for that particular cage is rendered inoperative. It will be understood that while this switch is shown in 65 the main 37, it may be positioned at any suit-

able point as circumstances may direct. For example, if positioned in the main 37 above the branch 39, for example at 52', the opening of such switch will cut out all of 70 that part of the system which is operated in accordance with the predetermined schedule, but will leave in operative condition that portion of the system which shows the actual position of the car.

It is desirable in some instances that the 75 car operator receive a warning signal prior to the giving of the starting signal, so that he can make ready and be prepared to proceed as soon as the starting signal is given. This feature forms a part of the present in- 80 vention and constitutes, in practice, a great time saver. I have thus far described the signals G, T and G_a and T_a, as the starting signals or indicators and they may be thus 85 operated in practice. It will be noted, however, that in series or multiple with these indicators is shown a magnet 53 which serves to control a clapper 54 cooperating with an associated bell 55. When the indicators G, T, 90 G_a or T_a are energized, the coil 53 will simultaneously be energized and will withdraw the clapper, which functions as its armature, away from the bell 55. As soon 95 as the visual indicator is de-energized, however, the clapper is caused to engage with the bell either by gravity or a spring thereby producing an audible indication. With this ar- 100 rangement, the visual indicators serve as a warning signal while the audible indicators serve as the actual starting signal.

It will be apparent from the foregoing de- 105 tailed description of this invention in its preferred form, that the present system embodies many novel features of advantage not found in prior systems. For example, the 110 present invention provides means whereby the operator of a car will know at all times whether he is on schedule or if not whether he is before or behind schedule and how much. This feature is basically novel.

Moreover, in the preferred form of the in- 115 vention, I am able to accomplish this result with one set of indicators through the employment of the resistance 43 which has been described. However, any equivalent struc- 120 ture may be used. Furthermore, the lamps, for showing the position at which the car should be, can in practice be of a different color, shape or size than the lamps which show the actual position of the car, so that, no confusion can possibly result.

It will be also apparent that while I have 125 diagrammatically shown commutators, that any suitable form of selective device may be employed.

For the reasons given, the invention is to be understood as fully commensurate with the appended claims.

Having thus fully described the invention, 130

what I claim as new and desire to secure by Letters Patent is:

1. In an elevator system, the combination with an elevator car mounted to travel in a shaft, of a plurality of indicators corresponding to the several floors served by the car, car-controlled means for displaying said indicators in succession as the car passes the corresponding floors, time-controlled means for displaying said indicators in succession in accordance with a predetermined schedule, and means for differentiating between the indications displayed by said car-controlled means and the indications displayed by said time-controlled means, whereby it can be determined whether or not the car is travelling in accordance with the predetermined schedule for such car.

2. In an elevator system, the combination with an elevator car mounted to travel in a shaft, of a plurality of indicators corresponding to the several floors served by the car, means synchronized with the movement of said car for causing the display of said indicators individually to indicate car position, time-controlled means for independently causing the display of said indicators in succession in accordance with a predetermined schedule so as continuously to indicate the floor at which the car should be, means for differentiating between the indications whose display is controlled by car movement and the indications whose display is controlled by time, a signal for starting said car from each terminal floor served by the car, and means responsive to said time-controlled means for operating said starting signal at such a time that upon reasonable compliance of the car with said starting signal said car may attain its said predetermined schedule for the floors adjacent the terminal floors.

3. In a scheduling system for an elevator, the combination of an elevator cage adapted to serve a plurality of landings, a plurality of indicators, one for each of a plurality of landings, means governed by the position of the cage for operating the indicators in accordance with the travel of the cage, means operable in accordance with a predetermined schedule for independently operating the indicators in succession, and means for differentiating between the indications produced by the means governed by the position of the cage and the indications produced by the means operable in accordance with said predetermined schedule.

4. In a scheduling system for an elevator, the combination of an elevator cage adapted to serve a plurality of landings, a series of symbols carried by the cage and severally corresponding to the different landings, means for illuminating said symbols, selective means, operable in accordance with cage movement, and operably connected to cause

the illumination of symbols by said illuminating means as the cage moves for the purpose of indicating the position of the cage, selective means operable in accordance with a pre-arranged schedule for independently causing the illumination of said symbols by said illuminating means to indicate the position in which the cage should be according to said schedule, and means for causing the intensity of illumination of the symbols to indicate the position of the cage to be different from the intensity of illumination of the symbols to indicate according to said schedule.

5. In an elevator system; an elevator car serving a plurality of floors; an element movable in accordance with the position of said car so that its position is representative of the actual position of said car; a time driven device; a second element; means controlled by said time device for moving said second element in accordance with a predetermined schedule for said car so that the position of said second element is representative of where said car should be with respect to said floors in accordance with said predetermined schedule; a plurality of indicating means; and means controlled conjointly by said two elements for operating said indicating means to indicate the difference between where the car actually is, and where, according to said predetermined schedule, said car should be.

6. In a scheduling system for an elevator cage, means operable in accordance with the cage movement, time controlled means, means controlled by both the means operable in accordance with the cage movement and the time controlled means to simultaneously indicate, by distinguishable, visual indications, the position of the cage in the shaft and the position where it should be when operated in accordance with a pre-arranged schedule, and additional indicating means for the terminal landings controlled by said time controlled means to signal the operator of the cage the times at which to leave said terminal landings.

7. In a scheduling system for an elevator cage adapted to serve a plurality of landings, indicating means on the cage for each of said landings, means operable on a pre-arranged schedule for causing the operation of said indicating means to indicate continuously the required position of the car in accordance with said pre-arranged schedule, and signals on the cage for the terminal landings also operated by said means operating on a pre-arranged schedule to signal the car operator to leave said terminal landings.

8. In a scheduling system for an elevator, the combination of a cage adapted to serve a plurality of landings, a series of symbols carried by the cage and severally corresponding to the different landings, a lamp for illuminating each of said symbols, selective means, op-

erable in accordance with cage movement, operatively connected with said lamps to energize them in succession as the cage travels, for the purpose of illuminating the symbols to indicate the position of the cage, selective means operable in accordance with a pre-arranged schedule for independently energizing said lamps in succession to also cause the illumination of the corresponding symbols to indicate the position in which the cage should be in accordance with said schedule, and resistance means in series with one of said selective means and the lamps for causing the lamps to glow with less intensity when energized through the selective means with which the resistance means is in series.

9. In a scheduling system for an elevator cage serving a plurality of landings, a plurality of indicators, one for each of said landings, means operable in accordance with a pre-arranged schedule for operating said indicators in succession, and additional indicators for the terminal landings also controlled by the means operable in accordance with said pre-arranged schedule to signal the operator of the cage the times at which to leave said terminal landings.

10. In an elevator system; an elevator car; a landing served by said car; signal means operable to indicate when said car should arrive at said landing, to indicate the desired period of rest of said car at said landing and to indicate when said car should leave said landing; and time controlled means for operating said signal means in accordance with a predetermined schedule.

11. In an elevator system; an elevator car; a landing served by said car; signal means operable in accordance with a predetermined schedule to indicate when said car should arrive at said landing, the desired period of rest of said car at said landing and to dispatch said car from said landing; and time controlled means operated in accordance with said schedule for causing the operation of said signal means when said car should arrive at said landing, for maintaining said signal means operated during the period of rest of said car at said landing and for terminating the operation of said signal means to dispatch said car from said landing at the expiration of said period of rest.

12. In an elevator system; an elevator car; a landing served thereby; signalling means corresponding to said landing; time controlled means for operating said signalling means at predetermined intervals and for predetermined periods of time to indicate that the car is scheduled to be positioned at said landing and to remain thereat during the operation of said signalling means; other signalling means for dispatching said car from said landing at the expiration of said periods; and means controlled by said time controlled means for causing the operation of said other

signalling means upon the cessation of operation of said first mentioned signalling means.

13. In an elevator system; an elevator car; a landing served thereby; signalling means corresponding to said landing; time controlled means for operating said signalling means at predetermined intervals and for predetermined periods of time to indicate that the car is scheduled to arrive at said landing and to remain thereat during the operation of said signalling means; other signalling means adapted to be operated to dispatch said car from said landing, the operation of said other signalling means being dependent upon the cessation of operation of said first mentioned signalling means; and means controlled by said time controlled means for operating said other signalling means upon the expiration of said periods of time.

14. In an elevator system; an elevator car; a landing served thereby; signalling means corresponding to said landing; time controlled means for operating said signalling means at predetermined intervals and for predetermined periods of time to indicate that the car is scheduled to arrive at said landing and to remain thereat during the operation of said signalling means; other signalling means adapted to be operated to dispatch said car from said landing; and means controlled by the operation of said first mentioned signalling means for causing the operation of said other signalling means at the expiration of said periods of time.

15. In an elevator system; an elevator car; a plurality of landings, including terminal landings and intermediate landings, served by said car; an indicating device carried by said car, said indicating device having a plurality of signal means, one for each of said intermediate landings; means responsive to the movement of said car for selectively operating said signal means to indicate the position of said car; time controlled means for operating said signal means in succession in accordance with the progression of said intermediate landings to indicate the scheduled position of said car; means for differentiating between the indications of said signal means by said car responsive means and the indications thereof by said time controlled means to inform the operator of said car of the position of the car relatively to the scheduled position thereof; and other signal means carried by said car, said other signal means corresponding to the terminal landings and being selectively operable by said time controlled means to indicate that the car is scheduled to be positioned at said terminals.

16. In an elevator system; an elevator car; a plurality of landings, including terminal landings and intermediate landings, served by said car; an indicating device carried by said car, said indicating device having a plu-

5 rality of signal means, one for each of said
 intermediate landings; means responsive to
 the movement of said car for selectively op-
 erating said signal means to indicate the posi-
 10 tion of said car; time controlled means for
 operating said signal means in succession in
 accordance with the progression of said inter-
 mediate landings to indicate the scheduled
 position of said car; means for differentiating
 15 between the indications of said signal means
 by said car responsive means and the indica-
 tions thereof by said time controlled means
 to inform the operator of said car of the posi-
 tion of the car relatively to the scheduled
 20 position thereof; other signal means carried
 by said car, said other signal means corre-
 sponding to the terminal landings and being
 selectively operable by said time controlled
 means to indicate that the car is scheduled to
 25 be positioned at said terminals; a starting
 signal operable to dispatch said car from said
 landings; and means associated with said
 other signal means and controlled by said
 time controlled means for operating said
 starting signal.

30 17. In a signalling system for an elevator
 car serving a plurality of landings, includ-
 ing terminal landings and intermediate land-
 ings; an indicating device on said car, said
 indicating device having a plurality of sig-
 35 nal means, at least one for each of said land-
 ings; switching equipment operable to cause
 the operation of said signal means consecu-
 tively, in the order of said floors from one
 40 terminal to the other terminal and return;
 a uniformly operative timing device; means
 connecting said timing device to said switch-
 ing equipment for effecting a drive for said
 switching equipment at a uniform rate; and
 45 means for varying the length of time a ter-
 minal landing indicator is operated with re-
 spect to the length of time any intermediate
 landing indicator is operated.

50 18. In a signalling system for an elevator
 car serving a plurality of landings, including
 terminal landings and intermediate landings;
 indicators for said landings for showing,
 when displayed, that said car should be at the
 landing corresponding to the indicator dis-
 55 played; switching equipment for each indi-
 cator which, when operated, causes the dis-
 play of the corresponding indicator; a con-
 tinuously-operative constant-speed device;
 and means responsive to said constant-speed
 60 device for operating said switching equip-
 ment for all intermediate landings succes-
 sively for substantially equal times at sub-
 stantially equal intervals and for a terminal
 landing for a time substantially longer than
 the times for the intermediate landings.

65 19. In a signalling system for an elevator
 car serving a plurality of landings, including
 terminal landings and intermediate landings;
 an indicating device on said car, said indi-
 cating device having a plurality of signal

means, at least one for each of said landings;
 switching equipment operable to cause the
 operation of said signal means consecutively,
 in the order of said floors from one terminal
 to the other terminal and return; a uniform-
 70 ly operative timing device, and means con-
 necting said timing device to said switching
 equipment for effecting a drive for said
 switching equipment at a uniform rate, in-
 cluding means for varying the length of times
 75 the terminal landing indicators are operated,
 inversely one to the other, with respect to
 the length of time any intermediate landing
 indicator is operated, said means for vary-
 ing the length of times the terminal landing
 80 indicators are operated comprising adjust-
 ing means in said connecting means.

85 20. In an elevator signalling system; an
 elevator car serving a plurality of landings
 including terminal landings and intermedi-
 ate landings; an indicator for each of said
 landings; means responsive to the actual po-
 sition of said car for operating said inter-
 mediate landing indicators to indicate where
 said car actually is; other means for operat-
 90 ing said intermediate landing indicators,
 said other means also being effective to oper-
 ate said terminal landing indicators; means
 for differentiating between the indications
 caused by said car responsive means and the
 95 indications caused by said other means; a
 uniformly operative timing device, and
 mechanism connecting said timing device to
 said other means for operating said other
 means to effect operation of said interme-
 100 diate landing and terminal landing indica-
 tors successively in accordance with a pre-
 determined schedule for said car, said system
 also including means for changing the length
 of time said car is to remain at the landings
 while maintaining the total round trip time
 constant.

In testimony whereof I have signed the
 foregoing specification.

FRANZ A. BOEDTCHER. 110

115

120

125

130