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DISPATCHING SYSTEM FOR ELEVATOR CARS

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2 SHEETS—SHEET 1

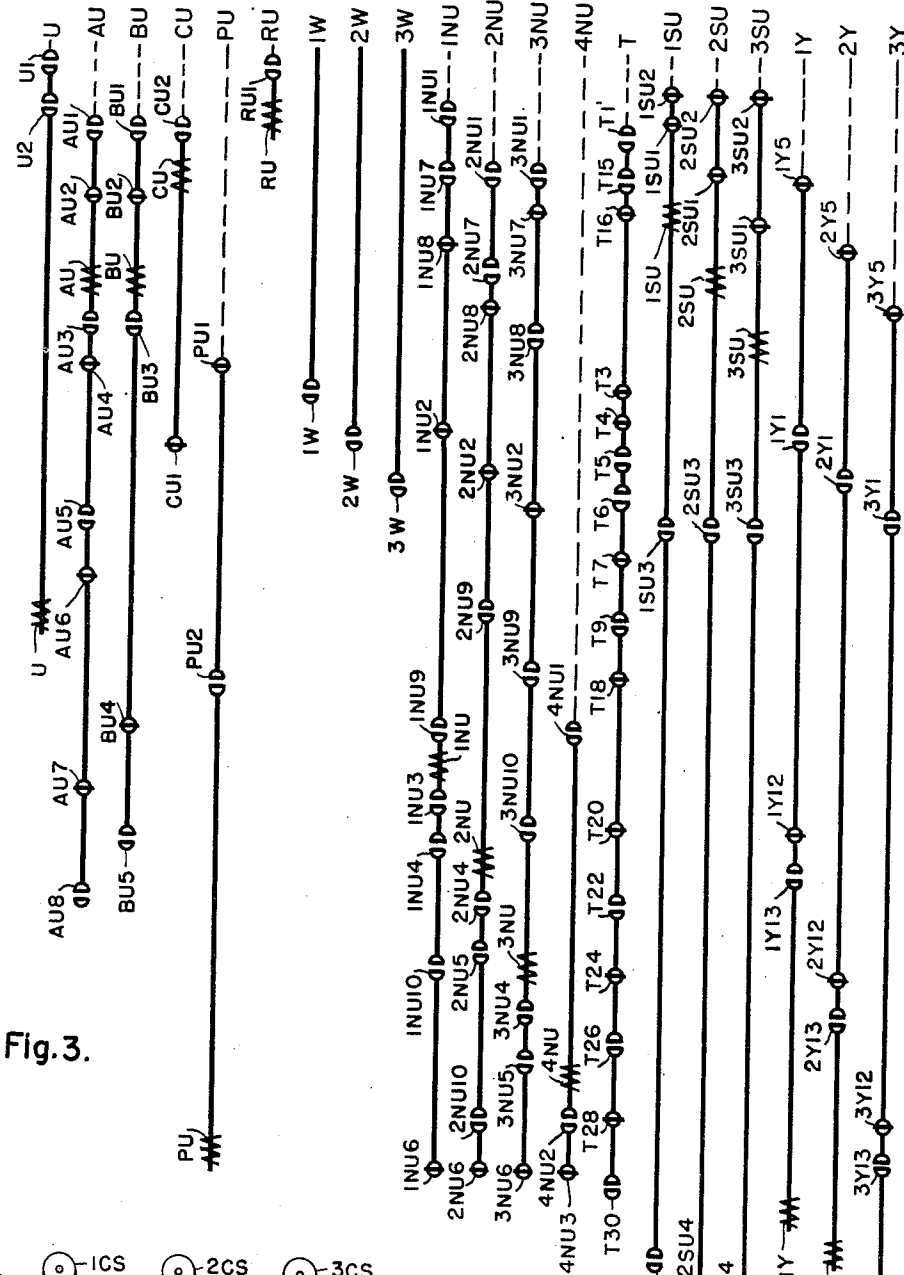


Fig. 3.

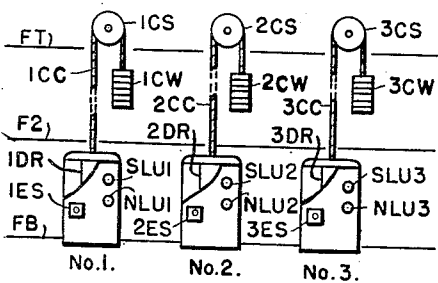


Fig. 1.

INVENTOR

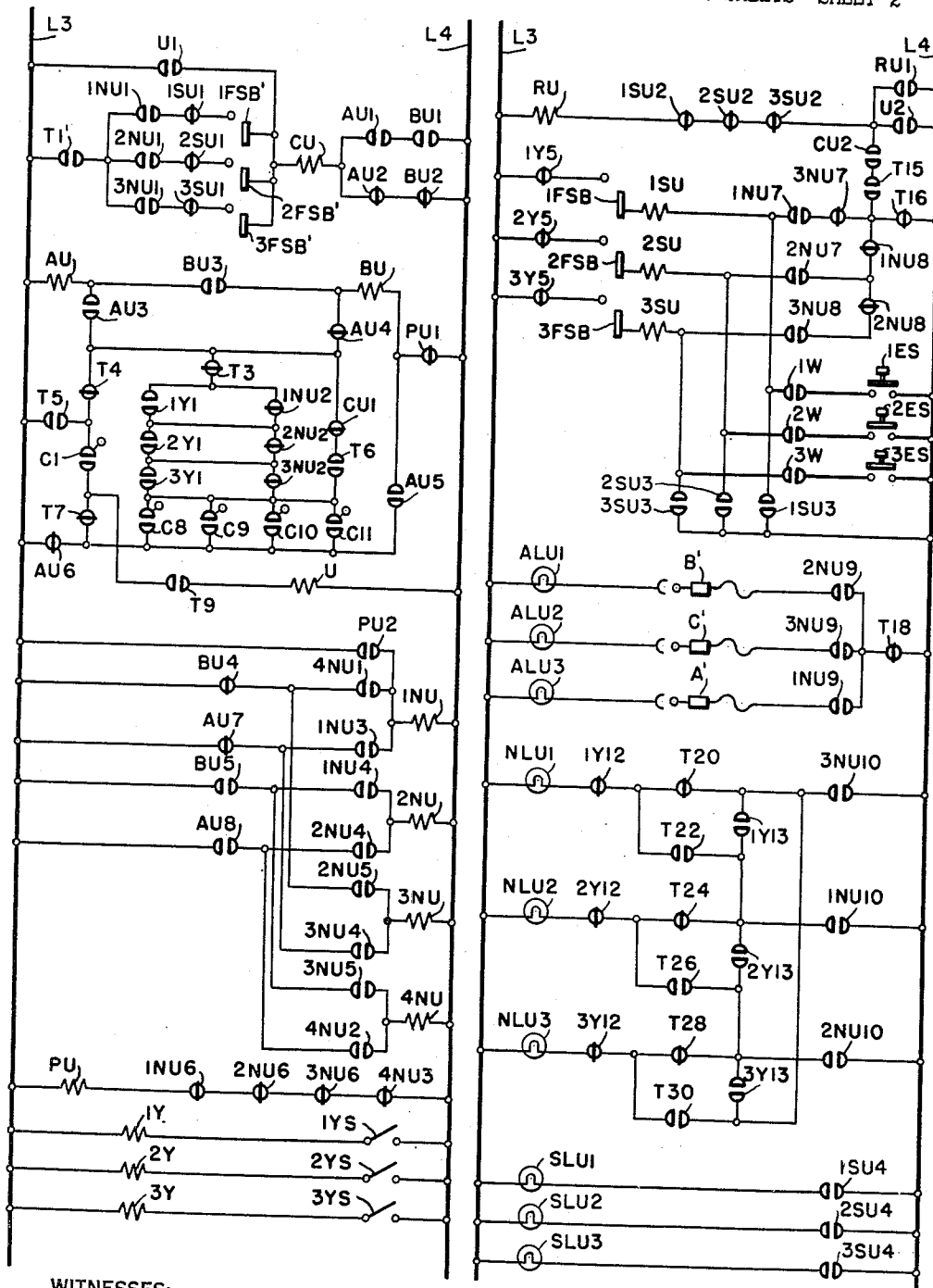
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2 SHEETS—SHEET 2



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Fig.2.

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DISPATCHING SYSTEM FOR ELEVATOR CARS

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6 Claims. (Cl. 187—29)

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This invention relates to an elevator system including a dispatching system for controlling the dispatch of elevator cars from a dispatching floor, and it has particular relation to a dispatching system which allows loading time for each of the elevator cars at the dispatching floors.

When banks of elevator cars are installed in a building or other structure, it is known practice to employ dispatching devices or dispatchers which determine the intervals between the dispatch of successive elevator cars from a dispatching floor. For suitable dispatching devices, reference may be made to the Williams et al. Patent 2,094,337.

Williams et al. discloses dispatching devices which may be connected for either rotational or non-rotational dispatching. The invention will be described with specific reference to a non-rotational dispatching device.

Dispatching devices may be employed for controlling automatic elevator cars or attendant-operated elevator cars. When a dispatching device assigns an automatic elevator car to be loaded at a dispatching floor, the dispatching device may initiate an automatic opening of the doors controlling the passage between the elevator car and the dispatching floor to permit loading of the elevator cars. When an attendant-operated elevator car is assigned to be loaded, the dispatching device may operate a suitable signal which notifies the car attendant that his elevator car has been selected as a next car to leave the dispatching floor and that he should start to load the elevator car. The car attendant then may open the doors controlling passage between his car and the dispatching floor to permit entry into his car of intending passengers.

If the dispatching device starts an automatic elevator car from the dispatching floor, it may close automatically the doors of the elevator car and start automatically the elevator car from the dispatching floor. In order to start an attendant-operated elevator car from the dispatching floor, the dispatching device may operate a suitable signal which notifies the car attendant that he should close his doors and start from the dispatching floor.

Although the invention may be employed in an automatic elevator system, it is particularly suitable for an attendant-operated elevator system and will be described in connection with such an attendant-operated system.

A dispatching system similar to that described in the aforesaid Williams et al. patent normally operates efficiently to control the movement of

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the elevator cars. However, if a large number of intending passengers are located on a dispatching floor, optimum efficiency may not be obtained in the loading of the elevator cars. For example, if a large number of intending passengers enter an elevator car at the dispatching floor and completely load the elevator car before the expiration of the loading time permitted by the dispatching device, the elevator car must await the expiration of the allotted time for loading before it receives a starting signal and such time must expire before another elevator car which may be at the dispatching floor can be assigned to be loaded.

In accordance with the invention, expediting means are provided which may be operated from each of the elevator cars for the purpose of expediting the assignment of another elevator car to be loaded at the dispatching floor. The expediting means also may be effective for expediting the start of a loaded elevator car from the dispatching floor.

The expediting means may take the form of an electrical switch which is located within the elevator car. If the elevator car is of the automatically-operated type, the electrical switch may be responsive to the load in the elevator car. For example, a load-weighing platform may be associated with the electrical switch. When a load in excess of a predetermined value, such as 80 per cent of the rated load, is on the platform within the elevator car, the switch is operated. Load-responsive switches are well known in the art.

In the case of an attendant-operated elevator car, the switch may be located within the elevator car for manual operation by the car attendant. In this case, the car attendant may operate the switch as soon as he observes that his car is about to become fully loaded.

In response to the operation of the electrical switch, another elevator car at the dispatching floor immediately may be assigned to be loaded. Also, the operation of the electrical switch may be effective for starting immediately the loaded elevator car from the dispatching floor. It should be noted that the assignment of another car to be loaded may be made before the doors associated with the loaded elevator car are closed. By the practice of the invention, it is possible to increase the rate of loading of the elevator cars by as much as 50 per cent.

It is, therefore, an object of the invention to provide an elevator system having a plurality of elevator cars associated in a bank and having dispatching means for dispatching the elevator

cars from a dispatching floor, wherein means are provided for expediting the loading of elevator cars.

It is a further object of the invention to provide an elevator system as defined in the preceding paragraph wherein the expediting means may be operated from within an elevator car being loaded to assign another elevator car at the dispatching floor to be loaded.

It is also an object of the invention to provide an elevator system as defined in either of the preceding two paragraphs wherein the expediting means is effective for expediting the starting of a loaded elevator car from the dispatching floor.

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

Fig. 1 is a view in elevation with parts broken away of an elevator system which may embody the invention;

Fig. 2 is a schematic view showing circuits in straight line form of a dispatching device suitable for the system of Fig. 1; and

Fig. 3 is a key sheet showing electromagnetic relays employed in the circuits of Fig. 2. If Figs. 2 and 3 are placed in horizontal alignment, it will be found that coils and contacts of the two figures are substantially in horizontal alignment.

Referring to the drawings, Fig. 1 shows an elevator system which includes three elevator cars Nos. 1, 2, and 3. Although it will be assumed that the invention is employed for a system having three elevator cars, it will be understood that the invention also is suitable for banks having other numbers of elevator cars serving any desired number of floors.

The elevator car No. 1 is connected to a counterweight (CW) by means of a cable (CC), which passes over a sheave (CS). It will be understood that the sheave (CS) is rotated by an electrical motor (not shown) for the purpose of moving the elevator car No. 1 relative to the floors of a building or structure with which the elevator car is associated. In Fig. 1 a lower terminal floor FB and an upper terminal floor FT are shown. A number of intermediate floors may be located between the two terminal floors, and one of these intermediate floors which may be the second floor F2 is illustrated in Fig. 1. The elevator cars Nos. 2 and 3 may be similar in construction to the elevator car No. 1. Conventional door means (DR, 2DR and 3DR) may be provided for controlling, respectively, the passages between the elevator cars Nos. 1, 2 and 3 and any floor at which the cars may be stopped.

Inasmuch as it is assumed that the elevator cars are of the car-attendant type, suitable signals are provided for controlling the loading and starting of each elevator car from a dispatching floor which will be assumed to be the lower terminal floor FB. For example, the elevator car No. 1 may contain a lamp NLU1, which when illuminated, advises the car attendant that he should start loading his elevator car at the lower dispatching floor. Similar lamps NLU2 and NLU3 are provided respectively for the elevator cars Nos. 2 and 3.

In addition, the elevator car No. 1 has a lamp SLU1, which when illuminated advises the car attendant that he should start his car from the lower terminal floor. Similar lamps SLU2 and SLU3 are provided respectively for the elevator cars Nos. 2 and 3.

For the purpose of expediting the assignment

of another car to be loaded and starting of a loaded car, an expediting switch (ES) is located within the elevator car No. 1 for manual operation by the car attendant. If desired, the switch (ES) may be combined with other switches located in the car. For example, if the car No. 1 contains a conventional by-pass switch, the switch (ES) may be provided in the form of contacts on the by-pass switch. Similar expediting switches 2ES and 3ES are provided, respectively, for the elevator cars Nos. 2 and 3.

Fig. 2 shows a dispatching device or dispatcher suitable for the system of Fig. 1. In order to present the invention as simply as possible, Fig. 2 has been based on the aforesaid Williams et al. patent. Although Williams et al. disclose dispatchers for both the upper and lower terminal floors, the invention can be described with reference to a dispatcher for the lower terminal floor alone. For this reason Fig. 2 is based on the Williams et al. dispatcher for the lower terminal floor.

The circuits shown on the left side of Fig. 2 are identical with those shown on the right side of the Williams et al. Fig. 3. The reference characters in the Williams et al. patent are also here employed to identify corresponding components. The circuits shown on the right side of Fig. 2 include those illustrated on the right side of Fig. 4 in the Williams et al. patent. The same reference characters employed by Williams et al. are here employed to designate the same components. In order to facilitate the presentation of the invention, a list of the apparatus common to the Williams et al. patent and to the present application is set forth as follows:

T—transfer relay
U—impulse relay
PU—pick-up relay
AU, BU—chain-driving relays
C1, C8, C9, C10, C11—contacts operated by timing motor
1NU, 2NU, 3NU, 4NU—next-up relays
CU—stepping relay
RU—signal-storing relay
1SU, 2SU, 3SU—start relays
SLU1, SLU2, SLU3—start signals
NLU1, NLU2, NLU3—next-up signals
1Y, 2Y, 3Y—out-of-service relays

The only circuits added to those disclosed in the Williams et al. patent are shown in Fig. 2 for additionally controlling the energizations of the start relays 1SU, 2SU, and 3SU. It will be noted that the added circuits include the switches 1ES, 2ES, and 3ES, which were discussed with reference to Fig. 1. The additional circuits also include switches 1W, 2W, and 3W, respectively, for the cars Nos. 1, 2, and 3.

The switch 1W is closed when the elevator car No. 1 is conditioned for up travel. This switch may be manually operated by the car attendant. Preferably, however, the switch is automatically operated to its closed condition whenever the elevator car is conditioned for up travel. Automatic up-direction relays for this purpose are well known in the art. For example, such a relay will be found in the Bouton et al. Patent 2,376,113, issued May 15, 1945. The dispatching device herein discussed may be employed with elevators of the type set forth in the Bouton et al. patent. The switches 2W and 3W are associated in a similar manner with the cars Nos. 2 and 3.

By reference to Fig. 2, it will be noted that

the start relay ISU now may be energized through the following circuit:

L3, 1Y5, 1FSB, 1SU, 1W, 1ES, L4

Corresponding energizing circuits for the start relays of the cars Nos. 2 and 3 may be traced similarly.

As long as the switches 1ES, 2ES, and 3ES are open, the dispatching device herein illustrated operates exactly in the manner discussed in the Williams et al. patent. However, for convenience, a typical operation of the dispatching device with the switches 1ES, 2ES, and 3ES open now will be set forth. The following discussion of the operation of the system is based on the premise that the dispatching device is connected for non-rotational operation. By reference to the Williams et al. patent, it will be noted that for such operation, the plugs A', B' and C' are all disconnected from the jacks. Furthermore, a transfer relay T is in its energized and picked-up condition (only certain contacts of the transfer relay T of the Williams et al. patent are reproduced in the present Fig. 2).

It will be assumed initially that the direct-current buses L3 and L4 are energized and that the contacts C1, C8, C9, C10, and C11 are repeatedly opened and closed by their associated timing motor in the manner set forth in the Williams et al. patent. It will be assumed further that all of the elevator cars are located at the lower dispatching floor.

At the time of energization of the buses L3 and L4 none of the elevator cars is assumed to be assigned to be loaded and all of the next-up relays 1NU, 2NU, 3NU and 4NU are deenergized. For this reason, the pick-up relay PU is energized through the break contacts of the next-up relays.

Upon energization, the pick-up relay PU opens its break contacts PU1 to prevent energization therethrough of the chain-driving relays AU and BU. Also, the make contacts PU2 close to complete an energizing circuit for the next-up relay 1NU.

As a result of its energization, the next-up relay 1NU closes its make contacts 1NU1 to complete the following energizing circuit for the stepping relay CU:

L3, T1', 1NU1, 1SU1, 1FSB', CU, AU2, BU2, L4

Opening of the break contacts 1NU2 has no immediate effect on the operation of the system. Closure of the make contacts 1NU3 establishes through the break contacts AU7 a holding circuit for the next-up relay 1NU. Closure of the make contacts 1NU4 has no immediate effect on the operation of the system. Break contacts 1NU6 in opening deenergize the pick-up relay PU. This relay recloses its break contacts PU1 to permit subsequent energization therethrough of the chain-driving relays AU and BU. Opening of the make contacts PU2 has no immediate effect on the operation of the system.

The next-up relay also closes its make contacts 1NU7 to prepare the start relay ISU for subsequent energization. Opening of the break contacts 1NU8 prevents energization therethrough of the start relays for the remaining elevator cars. Contacts 1NU9 have no effect during non-rotational operation of the dispatcher.

Finally, the next-up relay 1NU closes its make

contacts 1NU10 to complete the following circuit for the next-up signal NLU1:

L3, NLU1, 1Y12, T22, 1NU10, L4

As a result of its illumination, the next-up signal NLU1 informs the car attendant in car No. 1 that his car has been selected as the next car to leave the lower dispatching floor. Consequently, the car attendant opens the doors controlling the passage between his car and the lower dispatching floor to permit entrance of intending passengers.

Next it will be assumed that the contact members C1 are closed by the timer motor. The operation of the timer motor is set forth in the aforesaid Williams et al. patent. As a result of the closure of the contact member C1, the impulse relay U is energized as follows:

L3, T5, C1, T9, U, L4

The energization of the impulse relay U is maintained only as long as its contact members C1 are closed.

The energization of the impulse relay U results in closure of the make contacts U1, but such closure has no immediate effect on the operation of the system. In addition, the make contacts U2 close to complete the following energizing circuit for the start relay ISU:

L3, 1Y5, 1FSB, 1SU, 1NU1, 3NU1, T15, CU2, U2, L4

The start relay opens its break contacts 1SU1 to deenergize the stepping relay CU. The break contacts 1SU2 open to prevent energization therethrough of the signal-storing relay RU. Since an elevator car is available for dispatching, no signal need be stored in the signal-storing relay RU. The start relay also closes its make contacts 1SU3 to complete through the contacts 1Y5 and the segment 1FSB a holding circuit for the start relay.

Finally, the start relay closes its make contacts 1SU4 to energize the start signal SLU1. This notifies the car attendant that it is time for his elevator car to leave the lower dispatching floor. Consequently, the elevator car attendant closes the doors associated with his elevator car and leaves the lower dispatching floor.

It will be recalled that the energization of the start relay ISU resulted in deenergization of the stepping relay CU. This relay recloses its break contacts CU1 to prepare the chain-driving relay BU for subsequent energization therethrough. Opening of the make contacts CU2 has no immediate effect on the operation of the system.

It will be assumed that one of the contact members C8, C9, C10 or C11 (such as C8) closes to complete with the reclosed contacts CU1 the following energizing circuit for the chain-driving relay BU:

L3, AU6, C8, T6, CU1, AU4, BU, PU1, L4

The chain-driving relay BU closes its make contacts BU1 and opens its break contacts BU2 without affecting immediately the operation of the system. The make contacts BU3 close to prepare the chain-driving relay AU for subsequent energization. Opening of the break contacts BU4 has no immediate effect on the operation of the system. However, closure of the make contacts BU5 completes through the contacts 1NU4 an energizing circuit for the next-up relay 2NU.

The energized next-up relay 2NU initiates operation of the next-up signal for the elevator car

No. 2 and prepares the start signal for the elevator car No. 2 for operation by a sequence which will be clear from the preceding discussion of the operation of the next-up and start signals for the elevator car No. 1 following energization of the next-up relay 1NU. Upon opening of the contact members C8 by the timer motor, the chain-driving relay AU is energized by the circuit

L3, AU, BU3, BU, PU1, L4

Following its energization, the chain-driving relay AU closes its make contacts AU1 to complete the following energizing circuit

L3, T1', 2NU1, 2SU1, 2FSB', CU, AU1, BUI, L4

Opening of the break contacts AU2 has no immediate effect on the operation of the system. Closing of make contacts AU3 and AU5 and opening of break contacts AU4 and AU6 have no immediate effect on the operation of the system. Opening of break contacts AU7 deenergizes the next-up relay 1NU. Closure of the make contacts AU8 completes through the make contacts 2NU4 a holding circuit for the next-up relay 2NU.

From the foregoing discussion, it will be observed that a substantial interval is allowed between the time at which the elevator car No. 1 is assigned to be loaded and the time at which the elevator car No. 1 is assigned to leave the dispatching floor. Furthermore, a substantial interval is allowed between the time at which the elevator car No. 1 is assigned to be loaded and the time at which the elevator car No. 2 is assigned to be loaded.

If a large number of intending passengers are waiting on the lower dispatching floor for transportation to higher floors, the elevator car No. 1 will be loaded rapidly. As soon as the elevator car attendant for the elevator car No. 1 notices that his elevator car is about to be loaded, he may operate his expediting switch 1ES to complete the following energizing circuit for the start relay 1SU:

L3, 1Y5, 1FSB, 1SU, 1W, 1ES, L4

As a result of this operation, the start relay 1SU promptly operates the start signal SLU1 to notify the car attendant that he may start elevator car No. 1 from the dispatching floor despite the fact that his normal loading time has not expired.

As a further result of the energization of the start relay 1SU, energization of the next-up signal NLU2 for the elevator car No. 2 is promptly effected in the manner set forth above to notify the car attendant in the elevator car No. 2 that he should start loading his elevator car. Consequently, the elevator car No. 2 may start to load as soon as the car attendant in elevator car No. 1 notices that his car is being rapidly loaded and operates his expediting switch 1ES.

In an analogous manner, the expediting switches 2ES and 3ES may be operated in the elevator cars Nos. 2 and 3 to operate the start signals prematurely in the respective cars and to transfer the next-up signal to another elevator car at the dispatching floor.

Although the invention has been described with reference to certain specific embodiments thereof, numerous modifications falling within the scope of the invention are possible. Consequently, the embodiments herein described are to be construed in an illustrative rather than a limiting sense.

I claim as my invention:

1. In an elevator system a structure having a plurality of floors including a dispatching floor,

a plurality of elevator cars, means for moving the elevator cars relative to the structure to serve the floors, and means for dispatching the elevator cars from the dispatching floor, said dispatching means comprising first means for assigning cars at the dispatching floors successively to be loaded, and second assigning means controlled from a first one of the cars at the dispatching floor for assigning a second car at the dispatching floor to be loaded.

2. In an elevator system a structure having a plurality of floors including a dispatching floor, a plurality of elevator cars, means for moving the elevator cars relative to the structure to serve the floors, and means for dispatching the elevator cars from the dispatching floor, said dispatching means comprising first means for assigning cars at the dispatching floors successively to be loaded, and second assigning means controlled from a first one of the cars at the dispatching floor for assigning a second car at the dispatching floor to be loaded, the last-named means including means for starting said first one of the cars from the dispatching floor.

3. In an elevator system a structure having a plurality of floors including a dispatching floor, a plurality of elevator cars, means for moving the elevator cars relative to the structure to serve the floors, and means for dispatching the elevator cars from the dispatching floor, said dispatching means comprising first means for assigning cars at the dispatching floors successively to be loaded, second assigning means controlled from a first one of the cars at the dispatching floor for assigning a second car at the dispatching floor to be loaded, and door means controlling the passage between the first one of the cars and the dispatching floors, said second assigning means being operable for assigning said second car to be loaded prior to closure of said door means.

4. In an elevator system, a structure having a plurality of floors including a dispatching floor, a plurality of elevator cars, means for moving the elevator cars relative to the structure to serve the floors, means including a loading relay effective when operated for preparing each of the elevator cars to be loaded at the dispatching floor, means including a starting relay effective when operated for preparing each of the elevator cars for departure from the dispatching floor, dispatching means for operating the loading relay of the next elevator car assigned to leave the dispatching floor and for thereafter operating the starting relay of such next elevator car, and translating means operable from within the next elevator car for operating the loading relay of another elevator car at the dispatching floor prior to the departure of said next elevator car from the dispatching floor.

5. In an elevator system, a structure having a plurality of floors including a dispatching floor, a plurality of elevator cars, means for moving the elevator cars relative to the structure to serve the floors, means including a loading relay effective when operated for preparing each of the elevator cars to be loaded at the dispatching floor, means including a starting relay effective when operated for preparing each of the elevator cars for departure from the dispatching floor, dispatching means for operating the loading relay of the next elevator car assigned to leave the dispatching floor and for thereafter operating the starting relay of such next elevator car, translating means operable from within the next elevator car for operating the loading relay of another elevator

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car at the dispatching floor prior to the departure of said next elevator car from the dispatching floor, and door means controlling the passage between each of the elevator cars and the dispatching floor, said translating means of the next elevator car being effective for operating the loading relay for another of the elevator cars prior to closure of the door means for the next elevator car.

6. In an elevator system, a structure having a plurality of floors including a dispatching floor, a plurality of elevator cars, means for moving the elevator cars relative to the structure to serve the floors, means including a loading relay effective when operated for preparing each of the elevator cars to be loaded at the dispatching floor, means including a starting relay effective when operated for preparing each of the elevator cars for departure from the dispatching floor, dis-

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patching means for operating the loading relay of the next elevator car assigned to leave the dispatching floor and for thereafter operating the starting relay of such next elevator car, and translating means operable from within the next elevator car for operating the loading relay of another elevator car at the dispatching floor prior to the departure of said next elevator car from the dispatching floor, said dispatching means operating at substantial intervals the loading relays of elevator cars at the dispatching floor, the translating means being operable from within the next elevator car for operating promptly the loading relay for another elevator car at the dispatching floor.

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No references cited.