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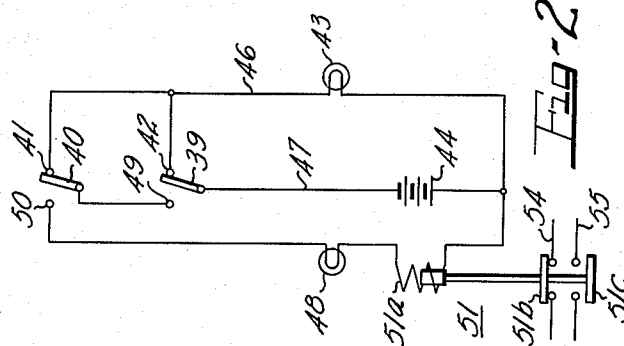
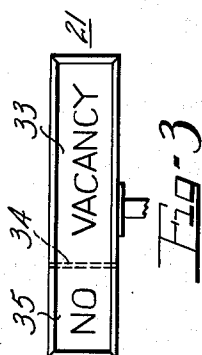
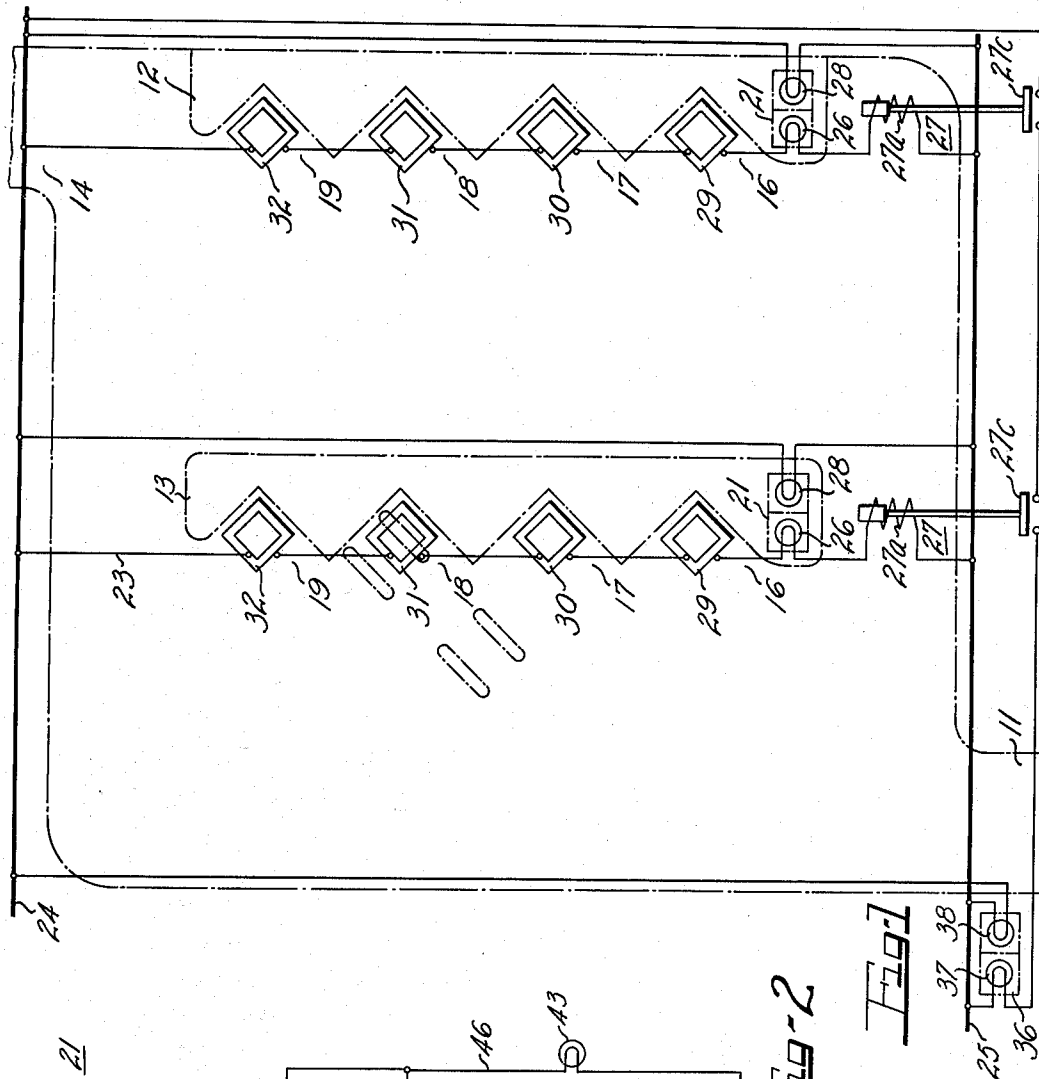
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2,733,426

CAR PARKING SYSTEM

Filed Feb. 15, 1955

2 Sheets-Sheet 1



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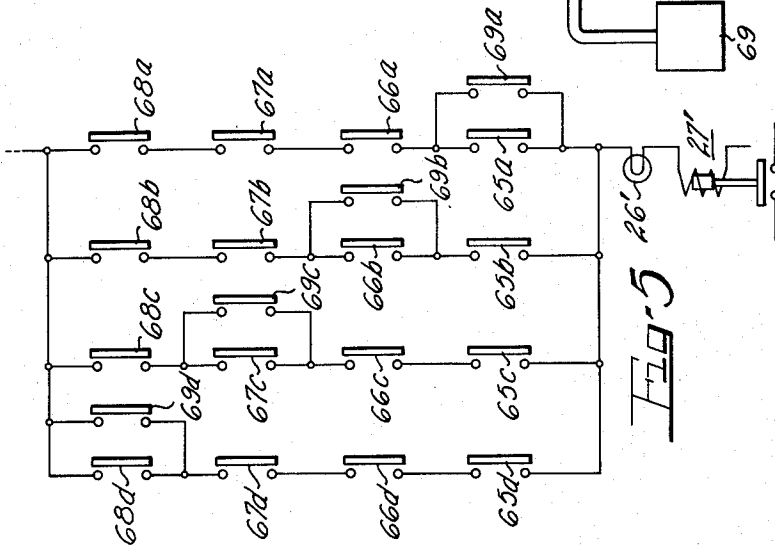
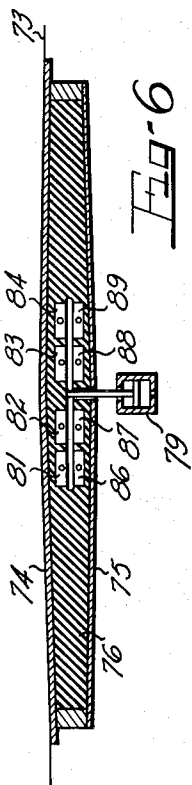
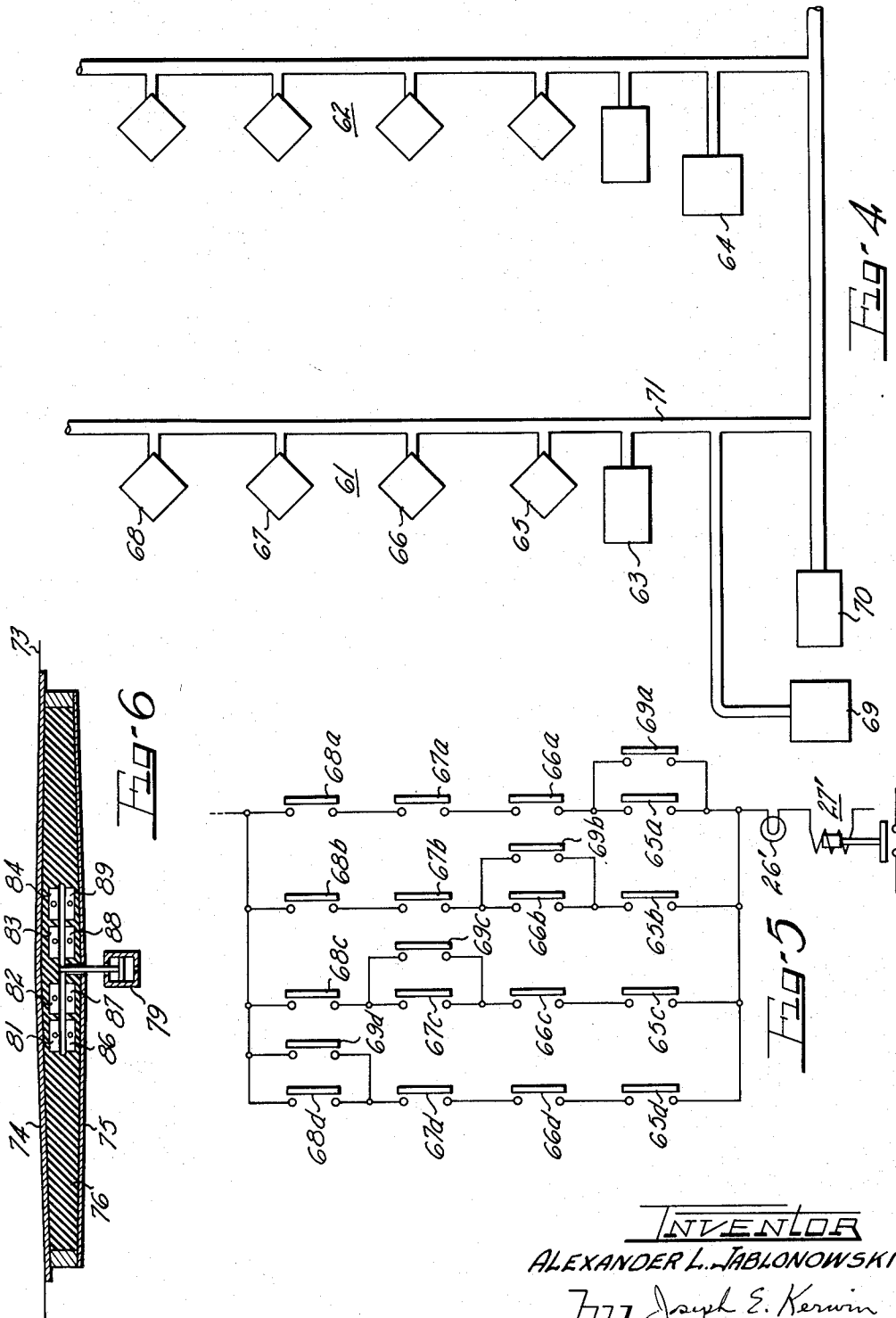
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CAR PARKING SYSTEM

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14 Claims. (Cl. 340—213)

My invention relates generally to car parking systems and in particular to systems for automatically signaling the status of a parking lot. The invention is adaptable to parking lots having one or more aisles for parking many cars, with visual signs at each aisle and at all entrances to the lot advising drivers whether there is a vacant car station in any aisle.

It is an object of my invention to provide a new system for a car parking lot, which is relatively simple and inexpensive to construct and is dependable in operation for advising drivers of a vacancy in the parking lot.

Another object of my invention is to provide in a parking lot a signal which indicates that all of the parking stations in each parking aisle are occupied with the signal immediately responsive to the movement of a car from any parking station without involving a delay until the departing car has neared the exit of the lot.

Still another object of my invention is to provide simultaneous signals at individual aisles inside a parking lot and at the entrances to the lot with those signals automatically responsive to indicate a vacancy in the lot because of a car moving from a parking station.

And another object of my invention is to provide a parking lot signal system to automatically warn drivers outside the parking lot that a sufficient number of cars have entered the lot to fill the vacant stations even though all the cars in the lot have not reached their respective parking stations, and with the signal system responsive immediately to show a vacancy when any car leaves its individual parking station.

These and other objects and advantages of my invention will be obvious to those skilled in the art from a consideration of the following description taken in conjunction with the accompanying drawing, in which:

Fig. 1 is a top view of a parking lot on which there is shown a diagram of an electrical circuit for a system embodying my invention;

Fig. 2 is a diagram of an alternative electrical circuit for an aisle of the parking lot illustrated in Fig. 1;

Fig. 3 is an elevation view of a suitable indicator for the aisles and entrance of the parking lot shown in Fig. 1;

Fig. 4 is a top view illustrating the arrangement of elements in a parking lot, for a modified electrical circuit embodying my invention;

Fig. 5 is a diagram of the modified part of the electrical circuit for the parking lot represented in Fig. 4, and

Fig. 6 is a sectional view of a suitable switch for the car stations of the parking lot illustrated in Fig. 4.

The car parking lot outlined by construction lines in Fig. 1 has an entrance 11, two parking aisles 12, 13 and an exit 14. The lot is intended to be illustrative only as the number of aisles, entrances or exits may vary without affecting the utilization of this invention. Likewise, while four parking stations 16, 17, 18 and 19 are

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illustrated in each aisle 12, 13 there may be more or fewer parking stations in any of the aisles.

At one end of each of the aisles and at each entrance to the lot there is an electrical sign type indicator. These indicators are automatically controlled by cars in the parking lot and may be any suitable visual semaphore or signal. In this instance this visual signal is represented as a lamp.

The visual sign is immediately responsive to the movement of a car from any parking station and advises drivers that a vacancy exists in a parking station within an aisle. The visual sign will continue to show a vacancy until cars again fill all parking stations of the aisle. As soon as the aisle is full, the electrically responsive visual sign will so advise drivers.

In the illustrated instance an aisle signal which, for a single aisle parking lot, may constitute the entire system includes a first circuit comprising the conductor 23 connected to a source of electrical energy represented by leads 24, 25. In series between those two leads there are normally open switches 29, 30, 31, 32 (one at each of the parking stations), an electrical responsive aisle lamp 26 and coil 27a of relay 27. The normally open switches are forced closed when touched by cars entering the parking stations. For this instance when the electrical responsive sign is a lamp, there is a second aisle circuit between the leads 25, 25. In this second circuit there is a second aisle lamp 28 which is turned on whenever the parking system is energized. The two aisle lamps 26, 28 are contained in a single visual indicator 21 (Fig. 3).

In order to make the two lamps provide visual signs advising that the aisle is full or has a vacancy, the indicator has two sections 33, 35 which are separated by an opaque barrier 34. Lamp 28 is in the right hand section 33 which has the word "Vacancy" painted on its cover glass. Since the lamp 26 is on whenever the system is energized, the "Vacancy" light is always illuminated. Lamp 26 is in the left hand section 35 which has the word "No" painted on its cover glass. The barrier prevents the lamp 28 from illuminating the cover glass of section 35.

A car is represented as being in one of the parking stations in which case the normally open switch of that parking station is closed. However, since all of the parking stations switches of each aisle are in series, the said first circuit of the aisle signal is not closed, and the electrical responsive sign or lamp 26 is not turned on until that circuit closes as a result of a car being in every parking station of the aisle. Then all of the parking station switches of that one aisle will be closed in series connecting the lamp 26 to the electrical source and illuminating the cover glass of section 35 whereby the indicator for that aisle will show "No vacancy" because both lamps in the indicator will be turned on. Similar aisle signals with like indicators are embodied in each aisle.

Besides the indicators for each aisle there are entrance signals which advise of the status of the entire lot by similar visual signs to drivers. The entrance signal includes indicator 36 (at each entrance to the parking lot) which is shown in Fig. 1 with lamps the same as the aisle indicators. Therefore, that entrance signal also has two circuits between the leads 24, 25 of the electrical source. The first entrance signal circuit has in series entrance lamp 37 and each of the normally open contacts 27c of the relays 27 of each aisle signal. The second circuit of the entrance signal has lamp 38 directly between the leads of the electrical source so that lamp 38 is always turned on and always illuminates a "Vacancy" sign when the system is energized. Lamp 37, however, is not turned on and does

not illuminate the cover glass painted "No" until the relays of all of the aisles are energized and the normally open contacts of those relays are closed in series with each other and with lamp 37.

A modified aisle signal having two way switches at each of the parking stations is shown in Fig. 2. In the modifications, however, only two parking stations are represented. The movable blades 39, 40 respectively, of the two parking station switches are biased to a normally closed position on contacts 41, 42 which are in parallel branches of a first signal circuit which includes lamp 43, source 44 and conductor 47. With either of the blades 39 or 40, biased to its normally closed position, lamp 43 is connected with source 44. For example, if a car enters the first parking station and forces movable blade 39 to close on contact 49, then the circuit to lamp 43 is through blade 39, contact 49, blade 40, contact 41, and conductor 46. And if a car enters the second parking station and forces movable blade 40 to close on contact 50, without a car being in the first parking station so that blade 39 of the first switch remains in its normal position against contact 42, the circuit is closed from source 44, conductor 47, blade 39, contact 42 to lamp 43. Thus, in either case lamp 43 stays on when any parking station is not occupied.

Lead 47 also comprises part of a second circuit of this modified aisle signal connecting lamp 48 to the source 44. This second circuit has all of the parking station switches in series when cars occupy all of the parking stations. When cars enter the parking stations, the blades 39, 40, of the switches in each station, individually are forced to engage contacts 49, 50 respectively, thereby energizing lamp 48 and open circuiting lamp 43. With this modified aisle signal, the indicators preferably will be separate and provide "Stop" and "Go" signs for drivers. Lamp 43 illuminates a "Go" sign; whereas, lamp 48 illuminates a "Stop" sign.

As in the first embodiment, in this modification the entrance signal responds to a change of the status of the aisles through relay 51 which has its coil 51a in series with the lamp 48. Relay 51 has a normally closed contact 51b in a "Go" light entrance circuit 54 and a normally open contact 51c in a "Stop" light entrance circuit 55.

Another modification of the parking system is shown in Figs. 4 and 5. With this modification it is possible to anticipate that the lot is full before all of the cars which are in the lot reach their respective parking stations. Yet the system is instantly responsive to advise of a vacancy when a car leaves any parking station without delay in the transmission of that advice until the departing car nears the exit of the lot. This feature of anticipating the full lot is accomplished by providing car waiting stations. In the illustrated instance there is one waiting station for each aisle in the lot.

For aisles 61 and 62, there are waiting stations 69 and 64, respectively. In other respects the arrangement of elements of the aisles is similar to the arrangement of elements shown in Fig. 1. These elements are the parking station switches 65, 66, 67, 68, aisle indicator 63, and entrance indicator 70 interconnected in Fig. 4 by conductor 71 for containing the conductors of the circuits. Fig. 5 shows the part of the aisle signal circuit which differs from the circuit described above with respect to Fig. 1. Parallel branches are included in the circuit, being in series with lamp 26' and relay 27'.

The number of parallel branches corresponds to the number of parking stations and every branch has in series a normally open contact of the car operable switch at each parking station. When a car touches switch 65, normally open contacts 65a, 65b, 65c and 65d close. And each of the other parking station switches 66, 67 and 68 closes its four contacts (identified by the switch numeral and letters a, b, c and d). In each of those parallel

branches there is a contact of the waiting station switch 69 in parallel with one of the contacts of the parking station switches. Specifically, in the example the waiting station switch has four normally open contacts, and in each branch one of those waiting station switch contacts is in parallel with a contact of a different parking station switch. The contacts 69a, 69b, 69c and 69d all close when a car touches the waiting station switch 69. Thus, when all but one of the parking stations are occupied, one of the branch circuits will close as soon as a car enters the lot and touches the waiting station switch, and immediately the entrance indicator will advise drivers outside of the lot that there are a sufficient number of cars in the lot to fill all the parking station; yet immediately a car leaves any parking station the branch circuits will all open, the aisle circuit relay will be deenergized opening the aisle circuit, and the indicator will advise drivers outside the lot that a vacancy exists.

While any suitable car operable switch may be utilized in this system an example of a wheel operated switch is shown in Fig. 6. This switch is recessed in the parking lot surface 73 and has a pair of plates 74, 75 which are separated by resilient insulating material 76, such as rubber. The upper plate 74 carries contacts 81, 82, 83, 84, which are insulated from each other and from the plate 74. The resilient material 76 biases those contacts into a normally open position away from contact elements 86, 87, 88, 89, but when a car is on the plate 74 those contacts are forced to touch the contact elements.

The waiting station contacts include means for delaying their opening so that, after a car leaves the waiting station, the entrance indicator will not change from "No vacancy" to "Vacancy" while the car is proceeding from the waiting station to its parking station. This delay may be provided for by a dashpot 79 in the wheel operated switch.

The switch shown in Fig. 6 may also be used for the parking stations. However, for parking stations switches the means for delaying opening of the contacts preferably is omitted so that the indicators will be immediately responsive to a car leaving a parking station.

The operation of this improved car parking system is generally covered by the above descriptive matter. Briefly, visual indicators are provided at each aisle to advise of any vacancy. This is done by either "Stop" and "Go" lights or "No vacancy" and "Vacancy," signs. At all times when the system is employed there is a light advising drivers of the status of the individual aisles and the lot on a whole. The system includes a circuit with all of the parking stations of any aisle in series so that the circuit is not complete until all of the parking stations are filled at which time the circuit is completed, and the indicator changes the sign.

In addition waiting stations may be added to the lot so that when a car is being parked, additional cars can enter the lot with assurance that they will find a parking station. But these additional cars cause the system to advise drivers outside of the lot that no more cars can be accommodated in the lot. The function of the waiting station is utilized when all but one parking station is occupied. The waiting station switch, of course, will close whenever touched by any car, but does not effect the electrical responsive sign unless all but one parking station of an aisle is closed. When all but one parking station is occupied, a contact of the waiting station switch will bypass the open parking station switch contact in that aisle indicator circuit. For example, if parking station switches 66, 67 and 68 are touched by cars, the four contacts of each of those switches will be closed. However, if parking station switch 65 is not touched, its four contacts will remain open so that the circuit to lamp 26' is incomplete. As soon as another car enters the lot and touches the waiting station switch 69, its four contacts will close with one of those contacts, 69a, by passing the open contact

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of parking station switch 65 in one branch circuit. With all of the parking station switches closed but one and with the contacts of that one switch by passed by a waiting station switch contact, the lamp 26' will be lighted advising drivers that this last car fills an aisle and the lot.

A single waiting station is illustrated for each aisle, and as shown in Fig. 4 each waiting station is situated in the lot so that a car first touches a waiting station switch and then the car approaches the aisle associated with that waiting station before reaching the waiting station of the next aisle. Thus the driver will be able to see the indicator of each aisle before he touches the waiting station which may cause the aisle indicator light to change.

Although I have illustrated only a few embodiments of my invention, and although the embodiment is referred to generally as alluding to cars generally it is intended to include true representations or toy representations of the same system. Also, modifications, of the embodiment shown will occur to those skilled in the art without departing from the scope of my invention, as defined by the appended claims.

It is claimed and desired to secure as Letters Patent:

1. A car parking system comprising a determinate number of parking stations, a waiting station, an aisle signal and an entrance signal, said aisle signal including a first circuit and a second circuit, said first circuit having in series a relay, a first aisle lamp and parallel branches of said determinate number, said branches being similar to each other and having in series normally open parking station switches of said determinate number and a normally open waiting station switch in parallel with one of said series switches, said series switches closing in response to a car entering said parking station with one of said series switches of each of said branches being closed in response to a car entering one of said parking stations, each of said waiting station switches being in parallel with a series switch of a different parking station in each of said branches, said waiting station switches being closed in response to a car entering said waiting station, said second circuit including a lamp connected to a source of electrical energy when said system is employed; said entrance signal including a first and a second circuit, said first entrance circuit connected to a source of electrical energy and having in series a first entrance lamp and a normally open contact of said relay, said second entrance circuit including a second entrance lamp connected to a source of electrical energy when said system is employed.

2. A car parking system comprising a first parking station, a second parking station, a waiting station, an aisle signal and an entrance signal; said aisle signal including a circuit connected to a source of electrical energy and having in series a relay, an electrical responsive sign, and two parallel branches, the first of said branches having in series a first normally open switch and a second normally open switch with a third normally open switch in parallel with said first switch, the second of said branches having in series a first normally open switch and a second normally open switch with a third normally open switch in parallel with said second switch of said second branch, said first switches being closed in response to a car entering said first parking station, said second switches being closed in response to a car entering said second parking station, said third switches being closed in response to a car entering said waiting station and having means for delaying their opening after a car leaves said waiting station; said entrance signal including a circuit connected to a source of electrical energy and having in series an electrical responsive sign and a normally open contact of said relay.

3. A car parking system comprising a determinate number of parking stations, a waiting station and an aisle signal, each of said stations having switches with normally open contacts which close in response to a car touching the respective said switches, said aisle signal

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having in series an electrical responsive sign and parallel branches of said determinate number, said branches each having in series one of said contacts of each said parking station switch, said branches each having one of said contacts of said waiting station switch in parallel with one of said series switch contacts, said waiting station contacts each being in parallel with the contact of a different parking station in each of said branches.

4. The parking system claimed in claim 3 wherein said waiting station includes means to delay opening of said waiting station switches.

5. A car parking system comprising a plurality of normally open parking switches, an electrical responsive aisle sign, a first aisle circuit means connecting said parking switches and said sign in series whereby said sign is energized when all of said switches are closed, and auxiliary circuit means including an auxiliary station switch so associated with said first circuit means and said parking switches for energizing said sign, said auxiliary circuit means being ineffective to energize said sign when any two of said parking switches are open and being effective to energize said sign when any one of said parking switches is open with the remaining of said parking switches closed.

6. The parking system as claimed in claim 5 wherein said first aisle circuit means includes a relay in series with said sign, said relay having a normally open contact, a first entrance circuit including an electrical responsive entrance sign and said contact of said relay whereby said entrance sign is energized when said relay is energized.

7. The parking system as claimed in claim 5, wherein said auxiliary circuit means includes means to remove said auxiliary circuit means from association with said first circuit means after a time delay.

8. The parking system as claimed in claim 5 wherein a second aisle circuit means is provided including a sign connected to a source of electrical energy whenever said system is employed.

9. The parking system as claimed in claim 5 wherein a second aisle circuit means is provided including a sign connected to a source of electrical energy when said first aisle circuit means is open.

10. The parking system as claimed in claim 2 wherein a second aisle circuit is provided including a second aisle lamp connected to a source of electrical energy whereby said second aisle lamp is on whenever said system is employed, and said entrance signal includes a second circuit including a second entrance sign connected to a source of electrical energy whenever said system is employed.

11. The parking system as claimed in claim 1 wherein said waiting station includes means to delay opening of said waiting station switches after a car leaves said waiting station.

12. A car parking system comprising an aisle and an aisle signal, said aisle signal including a first and a second circuit, said first circuit connected to a source of electrical energy and having in series a first aisle lamp, a "no" sign to be illuminated by said first aisle lamp, and a plurality of switches, each of said switches closing in response to a car entering each of said parking stations, said second circuit including a lamp connected to a source of electrical energy whenever said system is employed, and a "vacancy" sign disposed immediately to the right of said "no" sign to be illuminated by the lamp of said second circuit.

13. The car parking system claimed in claim 12 wherein said second circuit includes a relay in series with said lamp of said second circuit, said relay having a normally open contact, a first entrance circuit including an electrical responsive entrance sign and said contact of said relay whereby said entrance sign is energized when said relay is energized.

14. The car parking system claimed in claim 13 including a plurality of said aisles and said aisle signals and wherein the said contacts of each said relay of the said second circuits are in series in said first entrance circuit.

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