AUTOMOBILE PARKING AID SYSTEM

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--- MECHANICAL TRANSMISSION LINES

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AUTOMOBILE PARKING AID SYSTEM

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This invention relates to an electro-mechanical system which computes the correct handwheel position as a function of the car wheel position during the parking process and instructs the driver in the manner with which he is to properly rotate the handwheel.

With the number of automobiles on the highways continuously increasing the problem of parking one's car becomes more and more difficult to solve. In congested areas the motorist is generally confronted with the problem of having to park his car within an area which is not much greater than that of his own car. The procedure of parking his car in an area confined in this manner demands an experienced eye if the process is to be accomplished without a number of repeated trials. For those who lack the required experience the parking process involves a great number of unnecessary turns and twists at the handwheel before the vehicle is maneuvered in its desired position. This is often very time consuming because it entails a number of trials in which the car must be partially or totally withdrawn from the confines of the parking line adjacent to the sidewalk. Pointing the front of the car out into the traffic area an unnecessary number of times in this way also proves to be both hazardous and annoying to the motorist in that the steady flow of traffic is restrained. Moreover, parking difficulties also often give rise to the result where the motorist scratches the body of his own car or that of the one in front or behind him in his attempt to locate the vehicle in the proper position. As a remedy to this undesirable situation this specification describes a system which informs the motorist at every instant of time during the course of parking where the position of his handwheel should be. In this way the motorist can instantaneously observe the difference between the actual position of the handwheel and that which is necessary in order to properly park the car. Comparison of these two positions will thus enable the motorist to continuously apply corrections to the handwheel and consequently park his car in an optimum manner.

The drawing is a functional schematic diagram of the automobile parking aid system.

The control and computing system shown in the drawing may be described in the following manner. After the motorist stops along and adjacent to the car behind which he is going to park in the conventional way he depresses push button 1 which is released when the operator removes his finger. Depressing push button 1 activates the computing circuit and this state of the circuit is described by the lighting of lamp 2 which is located at the observation dial face of voltmeter 10. Relay 3 which is operated by the pulse arising as a result of depressing push button 1 remains in the operated state providing push button 4 and switch 5 are in their normal positions as shown in the drawing. With relay 3 in its operated state the coil of clutch 8 and potentiometer 9 are both energized. Energizing clutch 8 by this means establishes a mechanical connection between the front wheels 13 of the car and potentiometer 9. The shaft position of potentiometer 9 will thus be proportional to the angular position of the front wheel. In this connection, it does not matter which wheel is chosen since either one will be suitable for this purpose. Potentiometer 9 is of the functional type and its output voltage is proportional to the correct position of the handwheel. Beginning from the first instant that the car is being parked, the correct position of the handwheel is a function of the position of the car wheels. Since automobiles and trucks are available in different sizes, the relationship between the correct handwheel position and the position of the car wheels will, in general, be different for different sizes and shapes of automobiles. The winding of potentiometer 9 which is directly affected by this relationship must therefore be tailored to each type of vehicle.

The car wheel position 13 is observed by the shaft of potentiometer 9 through instrument which is maintained by the instant push button 1 is depressed. The output voltage of potentiometer 9 which varies with the car wheel position is applied to a voltmeter 10 whose needle 14 is deflected by the amount proportional to the applied voltage. Consequently, the angular position of the needle is indicative of the correct position of the handwheel. Rotating about the same center is a second needle 15 which is mechanically geared to the handwheel 16 to indicate its actual position. In order for the operator to properly park his car, therefore, he is required to only rotate the handwheel so that the positions of both indicating needles coincide during the parking time interval. Best results will be obtained when the operator backs up the car in a slow manner for this will enable him to exercise optimum control over the handwheel in relation to the car wheel position.

The absolute value of the handwheel position in relation to the car wheel position is the same whether the car is parked adjacent to the right or left sidewalk. The direction of the handwheel rotation is the only factor which is thereby affected. Relay 11 provides for this difference in rotational direction by reversing the input leads to voltmeter 10. Consequently, when relay 11 is operated, the voltmeter needle will be deflected in the direction opposite to that existing when the relay is in its released position. The magnitude of the deflection, however, depends only on the output voltage of potentiometer 9 and therefore it will not be affected by the state or position of relay 11. In order to select the proper state of relay 11, the vehicle operator has at his disposal two push buttons 1 and 12. Push button 1 is depressed when the car is to be parked at the left curb while push button 12 is depressed when the car is to be parked at the right curb. The events which occur when push button 1 is depressed have already been described. When push button 12 is depressed, the pulse which originates as a result of depression depresses relay 11 which remains in the operated state even though push button 12 is released. The operation of relay 11 also causes relay 3 to be operated. With the operation of relay 3 the conditions of the circuit correspond to those that occur when push button 1 is depressed with the exception that the input leads to the voltmeter 10 are now reversed. The circuit is arranged so that while the operation of relay 11 will cause the subsequent operation of relay 3, the operation of relay 3 will not influence the state of relay 11.

Cam 6 is mechanically connected and geared to the shaft of potentiometer 9. When the wiper of potentiometer 9 is at the end of its function and the vehicle operator is presumed to have exercised the required manipulations of the handwheel so that the car is properly parked, cam 6 is in the position where it depresses switch 5 and interrupts the voltage line leading to relays 3 and 11. Interrupting the voltage supply to these relays causes the state of relay 11 to change and this in turn causes relay 3 to be interrupted and the electrical supply to the control system to be switched off.
lays in this manner causes said relays to be released with the subsequent release of clutch 8 and the extinguishing of lamp 2. Cam 7 is henceforth free to return the circuit to its initial or starting position by resetting potentiometer 9 to its zero or starting position. Cam 6 will thus also be reset to its zero position. The combination of heart cam 7 and its follower has the property where the force exerted by the roller on the surface of the cam tends to rotate the cam and its shaft to the zero position shown in the drawing if the cam and shaft have been displaced from this position. Push button 4 has been introduced into the circuit to enable the driver to reset the system to zero and thus begin anew at any instant he wishes. Thus, if the driver pushed button 1 when he meant to push button 12 or if he did not correctly manipulate the handwheel in accordance with the instructions of the voltmeter needle 14, he may at any instant interrupt the parking procedure and start fresh by pushing button 4. The depression of button 4 momentarily interrupts the voltage supply to relays 3 and 11 and causes the circuit to return to its initial position in the manner corresponding to that of switch 5. In order to operate the automobile parking aid system, therefore, the driver is generally required to exercise control over only one push button and never more than two.

I claim:

1. An automobile parking aid system comprising in combination a potentiometer to provide a voltage output proportional to the correct handwheel position, a voltage measuring device to indicate the voltage output of said potentiometer, a first relay, an electrical path connecting the output of said potentiometer to the input of said voltage measuring device through a first armature and contact of said first relay, said first relay adapted to switch said potentiometer output from a first input terminal to a second input terminal of said voltage measuring device depending upon whether said automobile is to be parked at a right or left curb, a pointer mechanically coupled to the automobile handwheel adapted to indicate the angular position of said handwheel, said pointer being rotated about the center of the pointer of said voltage measuring device, a second relay adapted to be operated by a pulse and remain in its operated position through an armature holding circuit of said second relay for the duration of the parking process, a first pushbutton to provide said pulse to said second relay, said first pushbutton adapted to be operated whenever said parking aid system is to be employed for parking at the right curb, a second pushbutton adapted to provide a pulse for operating said first relay whenever said parking aid system is to be employed for parking at the left curb, said first relay adapted to remain in its operated position through an armature holding circuit of said first relay after receipt of a pulse from said second pushbutton, an electrical path from a second armature and contact of said first relay to the coil of said second relay to operate said second relay whenever said first relay is operated, an illuminating lamp to provide visibility of the moving pointer of said voltage measuring device, an electrical path from said illuminating lamp to the armature of said second relay, an electromagnetic clutch to mechanically couple the car wheels to the input shaft of said potentiometer whenever said parking aid system is to be employed, an electrical path from the coil of said electromagnetic clutch to the armature of said second relay for operating said clutch whenever said second relay is operated, a first cam and spring follower combination to retain the potentiometer shaft at its starting position whenever said electromagnetic clutch is disengaged, said first cam being mechanically coupled to the input shaft of said potentiometer, a voltage supply to provide operating voltage for said first and second relays, illuminating lamp, electromagnetic clutch, and potentiometer, a switch operated by a second cam to interrupt said voltage supply to the coils of said first and second relays and release said relays whenever said shaft of said potentiometer is located at its end position indicating said parking process has been completed, said second cam being mechanically coupled and rotated by the shaft of said potentiometer, and a third pushbutton connected in series with said switch to interrupt the electrical path from said voltage supply to said switch upon depression of said third pushbutton.

2. The automobile parking aid system of claim 1 wherein a mechanical spring attached to the shaft of said potentiometer retains said shaft at its starting position against a mechanical stop whenever said electromagnetic clutch is disengaged.

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