

April 26, 1960

O. BUTLER

2,934,159

TAXICAB CONTROL SYSTEM

Filed Feb. 6, 1956

2 Sheets-Sheet 1

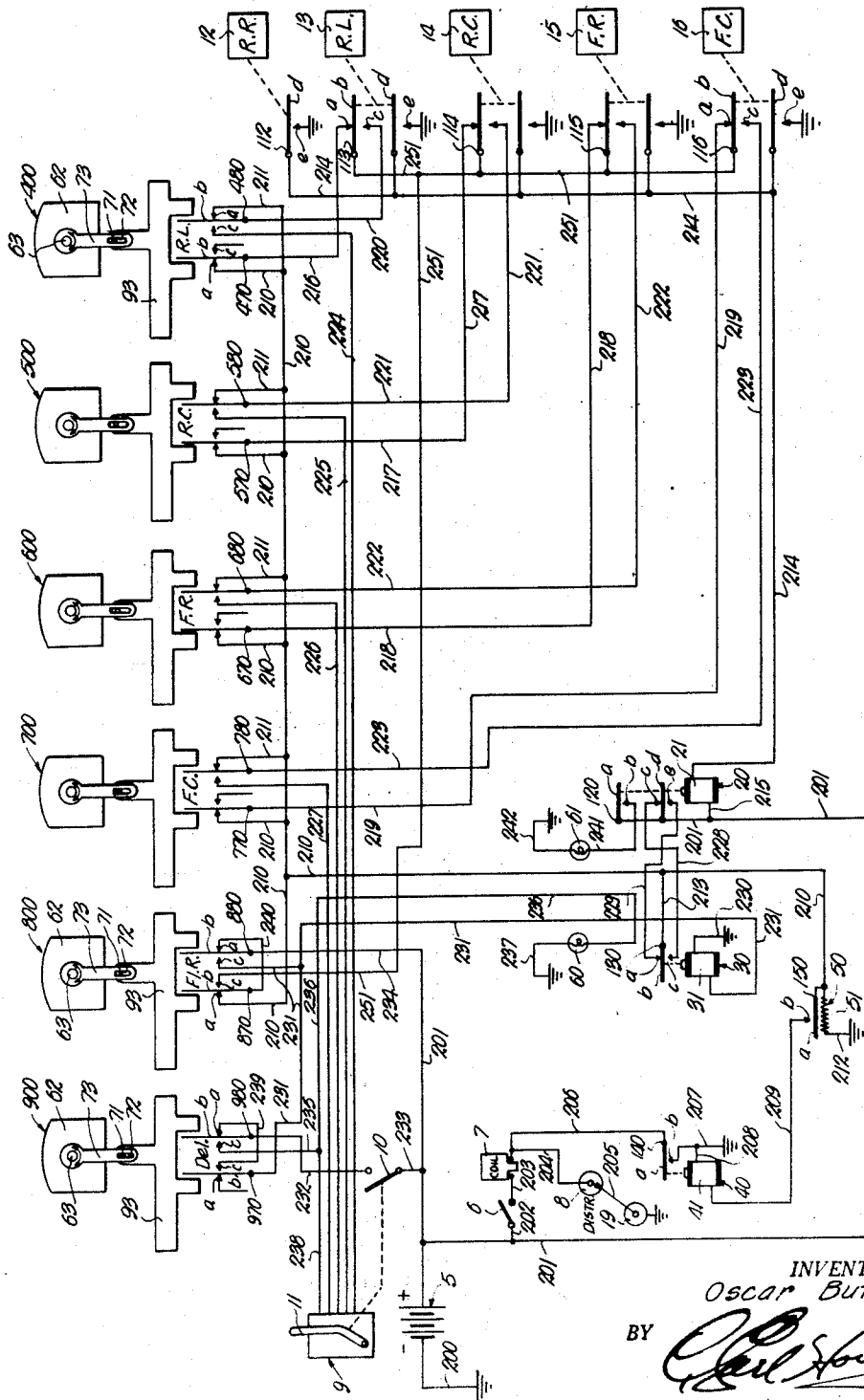


Fig. 1.

INVENTOR.
Oscar Butler
BY *Carl Young*
ATTORNEY.

April 26, 1960

O. BUTLER
TAXICAB CONTROL SYSTEM

2,934,159

Filed Feb. 6, 1956

2 Sheets-Sheet 2

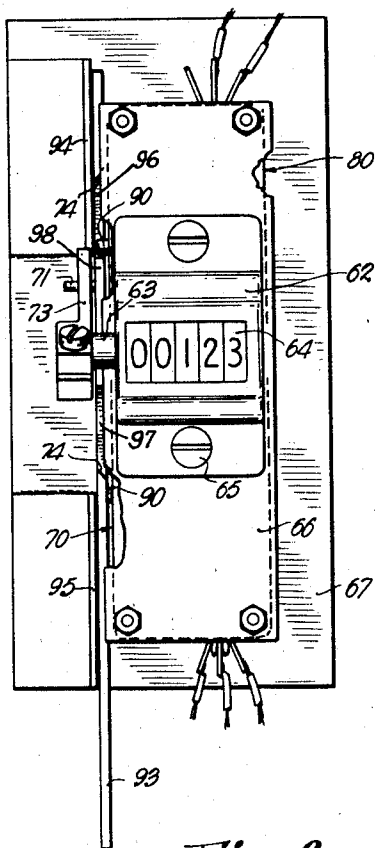


Fig. 2.

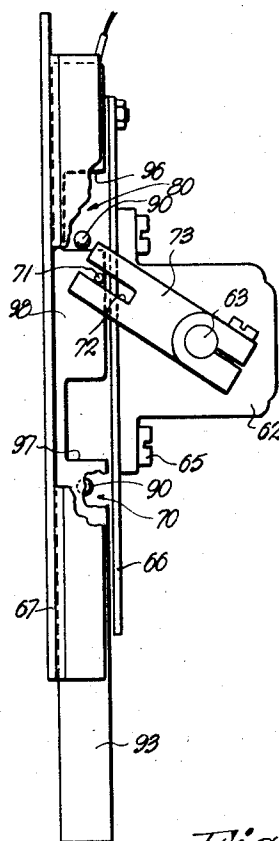


Fig. 3.

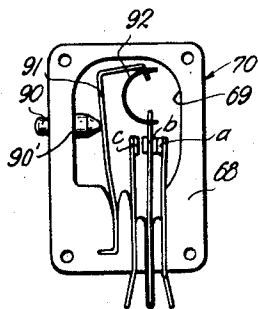


Fig. 4.

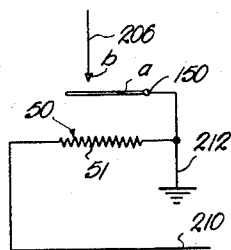


Fig. 5.

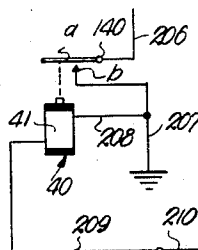


Fig. 6.

INVENTOR.
Oscar Butler
BY *Carl Honey*
ATTORNEY.

1

2,934,159

TAXICAB CONTROL SYSTEM

Oscar Butler, Kansas City, Mo.

Application February 6, 1956, Serial No. 563,678

10 Claims. (Cl. 180—82)

This invention relates to an electro-mechanical control system for taxicabs and, more particularly, to such a system having means for counting and recording the number of instances of operation of a taxicab under differing fare conditions, for requiring passengers to sit in predetermined positions within the taxicab depending upon the number of passengers simultaneously riding therein, and for requiring proper manipulation by the operator of the taxicab of the meter box lever conventionally provided for recording and indicating the time or distance during which the taxicab is operated under given fare conditions.

It is a primary object of this invention to improve upon the control systems disclosed in my United States Letters Patent No. 2,598,348, issued May 27, 1952, my copending application Serial No. 272,167, filed February 18, 1952, now United States Letters Patent No. 2,731,100, issued January 17, 1956, and my copending application Serial No. 312,027, filed September 29, 1952, now United States Letters Patent No. 2,792,901, issued May 21, 1957.

The systems disclosed in my said patents are quite satisfactory for use in many circumstances. However, the evolution of increasingly complex fare or charge schedules for operation of taxicabs under various conditions have given rise to a need for the improved and more comprehensive and versatile control system contemplated by this invention. In particular, it has become desirable to provide means for counting and recording the number of "extra passengers," i.e. the number of passengers over one, carried by the taxicab, so that the owners of the latter may have a means for checking or auditing the number of such transactions reported by the operator of the taxicab. It has moreover been found desirable to provide means for similarly counting and recording the number of times the taxicab is operated under conditions of carrying one or more passengers for a "flat rate" toll unrelated to the time or distance during which the taxicab is operated, as well as to likewise record the number of times the taxicab is operated for fare to make a delivery of a message, merchandise or the like not accompanied by any passengers. It has further been found advantageous to provide in a system for accomplishing such objectives means for requiring a particular pattern of seating of passengers designed for maximum safety to the operator of the taxicab and all concerned during its travel, and means for assuring that the meter box lever is properly operated in the usual fashion corresponding to the particular type of fare condition under which the taxicab is engaged.

Accordingly, it is one of the more important objects of this invention to provide means for solving all of the above mentioned problems and accomplishing all of the above mentioned, desired results.

Another important object of the invention is to provide such a system having manually operable, mechanical counting devices provided with means operably coupled with appropriate electrical switches for deenergizing

2

the ignition system of a taxicab under circumstances where the counters are not properly operated.

Another important object of the invention is to provide such a system wherein electrical switches associated with various portions of the seats of the taxicabs are each adapted for operation when a passenger is sitting upon the corresponding seat portion and are coupled by electrical portions of the system with both the mentioned counting and recording devices and the ignition system of the vehicle for concurrently defining the continuity of various circuits dictating a proper mode of operation for the counting and recording devices and for shunting a portion of the taxicab ignition system to render the same inoperable if passengers are seated in the taxicab in other than a predetermined fashion.

It is another important object of the invention to provide such a system wherein the ignition circuitry of the taxicab will be deenergized unless the meter box switch is properly operated in accordance with the condition of the seat switches and the manner in which at least certain of the counting and recording devices are operated.

It is another important object of the invention to provide such a system having time delay means associated with the circuitry for shunting a portion of the ignition system when same is to be rendered inoperative, whereby momentary continuities or discontinuities in the control circuitry arising from a passenger shifting his weight upon the seat or the operator taking a reasonable or finite period of time to properly operate the counting and recording devices will not result in deactivation of the taxicab.

Another important object of the invention is to provide means for accomplishing the foregoing and other advantageous results with apparatus which is of nature rendering the same virtually tamper-proof, by virtue of the fact that the portions of the system which might be subject to tampering may be conveniently housed in a locked or tamper-proof container, while the operation of the system is such that tampering with any of the remaining portions will result only in deactivation of the taxicab ignition system.

It is another important object of the invention to provide such a system utilizing apparatus of comparatively simple and rugged nature, thereby minimizing both initial installation and maintenance costs.

Still other important objects of the invention, including certain significant details of construction, will be made clear or become apparent as the following description of an illustrative embodiment of the invention progresses.

In the accompanying drawings:

Fig. 1 is a schematic diagram showing all of the electrical connections of the system and indicating their relationship with the mechanical portions of the apparatus employed in the system;

Fig. 2 is a plan view of one of the counting and recording devices utilized in the system;

Fig. 3 is an elevational view of the device shown in Fig. 2 with parts broken away for clarity of illustration;

Fig. 4 is an enlarged, detailed plan view of the working parts of one of the electrical switches utilized in the counting and recording devices employed in the system;

Fig. 5 is a fragmentary schematic diagram of a portion of the system, illustrating a modification; and

Fig. 6 is a fragmentary schematic diagram of a portion of the system, illustrating another modification;

Referring now to the drawings, the numeral 5 generally designates a battery, the numeral 6 an ignition switch, the numeral 7 an ignition coil or the like, the numeral 8 a distributor mechanism, and the numeral 19 one of the spark plugs, all forming a conventional part of the ignition circuit of the taxicab vehicle. The nu-

meral 9 generally designates a taxicab meter box provided with an operating lever 11 for closing an electrical meter switch 10. Meter box 9 may conventionally include, besides switch 10, various working parts and mechanisms (not shown) forming no specific part of the present invention, but which may conventionally include timing means, ticket printing means and other apparatus operably associated with the lever 11 for activation upon manipulation of the latter. Although the exact form thereof has no bearing upon this invention and same are not therefore shown in detail, it will be understood that the meter box 9 may also include electrically responsive means associated with the ticket printing means for making a particular indicia or record of the occurrence and perhaps duration of energization of the corresponding one of said electrically responsive means. By way of suggestion only, where the meter box 9 includes means for printing a record tape covering all of the taxicab's transactions, the electrically responsive means might be solenoid operated indicia printing devices.

The taxicab will also be understood to include front and rear seats of which particular portions are indicated in Fig. 1 as follows: the right section of the rear seat is represented at R.R. and designated 12, the left section of the rear seat is represented at R.L. and designated 13, the center section of the rear seat is represented at R.C. and designated 14, the right section of the front seat is represented at F.R. and designated 15 and the center section of the front seat is represented at F.C. and designated 16, the left or operator's section of the front seat not being specifically illustrated. With each of the seat sections 12-16 inclusive there is associated an electrical switch mechanism adapted to be operated when a passenger sits on such seat section. These switching mechanisms may be of construction generally similar to that suggested in my aforesaid patent, although any suitable construction may be employed which will present switches capable of the electrical functions hereinafter to be detailed. The switching mechanism for seat section 12 is generally designated 112, is of the normally open, single pole, single throw variety having a movable contact 112d adapted to engage a stationary contact 112e when a passenger sits upon seat section 12. Seat sections 13, 14, 15 and 16 are respectively provided with switching mechanisms 113, 114, 115 and 116, each of which includes a movable pole or contact *b* normally in engagement with a stationary contact *a* but adapted for engagement with a stationary contact *c* when a passenger sits upon the corresponding seat section 13 et seq. and with a movable contact *d* normally out of engagement with a stationary contact *e* but adapted to engage the latter when a passenger sits upon the corresponding seat section 13 et seq. For clarity in the drawings, the various contacts of switching mechanisms 112-116 inclusive are designated only by the appropriate letter, although hereinafter referred to with both the mechanism identifying numeral and the contact identifying letter. It may be observed that each of mechanisms 113-116 inclusive are actually includes a single pole, double throw type seat switch composed of contacts *a*, *b* and *c* which is ganged with a normally open, single pole, single throw seat switching instrumentality provided by the contacts *d* and *e*.

The system also utilizes three relays generally designated 20, 30 and 40 respectively. Relays 20, 30 and 40 are respectively provided with operating coils 21, 31 and 41. Relay 20 includes a switching mechanism 120 having a normally open, single pole, single throw portion comprised of a movable contact *a* adapted to engage a stationary contact *b* when the coil 21 is energized and a single pole, double throw portion comprised of a movable contact *d* normally in engagement with a stationary contact *c* and adapted to engage a stationary contact *e* when coil 21 is energized. Similarly, relay 30 is provided

with a single pole, double throw switching mechanism 130 having a movable contact *b* normally in engagement with a stationary contact *a* and adapted to engage a stationary contact *c* when the coil 31 is energized. Disabling relay switching structure 40 includes a normally open, single pole, single throw switching mechanism 140 having a moving contact *a* adapted to engage a stationary contact *b* when the coil 41 is energized.

A time delay switch generally designated 50 includes a resistance 51 and a normally open, single pole, single throw switching mechanism 150 having a movable contact *a* adapted to engage a stationary contact *b* a predetermined length of time after electrical current of predetermined minimum magnitude has commenced passing through resistance 51.

A pair of operating condition, indicating lights which are normally mounted externally of the taxicab and are preferably of different colors are provided and designated respectively 60 and 61.

Finally, a plurality of counting and recording devices are provided and generally designated 400, 500, 600, 700, 800 and 900. Each of devices 400 et seq. includes a mechanically operable counter unit 62 provided with a shaft 63 adapted for rotation through a limited arc with the unit being cocked or readied for a counting operation at one extreme of such arcuate rotation of the shaft 63 and actuated at the opposite extreme to advance the count recording discs 64 provided as a part thereof. Each of such counters 62 is secured by fastening means 65 to a plate 66 which is in turn mounted upon a base 67 in spaced relation thereto, the base 67 being adapted for attachment under the dashboard of the taxicab or in other location convenient to the operator. Disposed between the plate 66 and base 67 of each of the devices 400 et seq. are a pair of switching mechanisms generally designated 70 and 80 in Figs. 2, 3 and 4 and more particularly designated 470 and 480, 570 and 580, etc., depending upon the particular one of the devices 400 et seq. with which they are associated. The devices 70 and 80 are substantially identical, although it will be understood that the device 80 is turned oppositely to the device 70 when they are installed between plate 66 and base 67.

In Fig. 4, it will be clear that each of switches 70 and 80 includes a housing 68 having a cavity 69 therewithin within which are mounted a movable contact *b* (70b or 80b, as the case may be) normally in engagement with a stationary contact *a* and adapted for engagement with a stationary contact *c* upon inward reciprocation of an operating plunger 90 reciprocably mounted in housing 68 and bearing against a spring member 91 within cavity 69. Member 91 is coupled with the movable contact *b* through a semi-circular link 92, the movement of contact *b* from its normal engagement with contact *a* to engagement with contact *c* when the pin or plunger 90 is reciprocated inwardly being of a nature commonly referred to as "snap action." Although the precise form of the switches 70 and 80 forms no part of this invention, it should be noted that the housing 68 is of insulating material to electrically isolate the contacts *a*, *b* and *c*, except when same are interengaged within the cavity 69, and that the spring action of member 91 bearing as it does against the inner extremity of pin 90 normally biases the latter outwardly until a shoulder 90' on pin 90 within cavity 69 is in abutment with the wall of housing 68 defining the cavity 69, the other extremity of the pin 90 then extending a substantial distance outwardly from the housing 68.

Each of the devices 400 et seq. also includes an elongated manually reciprocable operating element 93 reciprocably carried by the base 67 and confined against movement away therefrom by the overlapping of plate 66. A pair of laterally extending flanges 94 and 95 on the base 67 further confine the element 93 between such flanges 94 and 95 and the switches 70 and 80, as best shown in Fig. 2. The element 93 is provided with cutouts 96 and 97 of size and spacing such that the element 93 may

5

be reciprocated to a position where the pins 90 of both of switches 70 and 80 are cleared respectively by the cutouts 96 and 97. Element 93 also includes a portion 98 between cutouts 96 and 97, which is adapted to always remain between the pins 90 of switches 70 and 80 and to abut against one or the other at opposite extremities of the path of reciprocation of the element 93 for limiting such path of reciprocation and confining the element 93 therewithin. As will be most clear in Fig. 2, the edges of element 93 defining the remote extremities of cutouts 96 and 97 are inwardly beveled as at 74, so that the element 93 may inwardly reciprocate the pin 90 of either switch 70 or switch 80 depending upon the direction in which the element 93 is reciprocated.

The intermediate portion 98 of each element 93 carries a laterally extending pin 71 which is received within an elongated slot 72 of a crank member 73 secured to the shaft 63 of the unit 62. It will thus be apparent that as element 93 is reciprocated the member 73 is swung to rotate shaft 63 from one extreme of its arc of rotation to the other. As heretofore pointed out, the units 62 count and ready themselves for counting respectively only when the shaft 63 is turned to the corresponding extreme of its arc of rotation. Accordingly, the cutouts 96 and 97 are so dimensioned and exposed that the readying action of the units 62 occurs when the elements 93 are reciprocated to the position shown in Figs. 2 and 3 whereat the pin 90 of the switch 70 has traveled under the beveled edge 74 and is held in its inwardly reciprocated or switch operating position by the presence and pressure of element 93 thereagainst. It is notable in Figs. 2 and 3 that the remote extremity of portion 98 is then abutting against the pin 90 of switch 80. As the element 93 is reciprocated in the opposite direction, element 93 first clears the pin 90 of switch 70 in the cutout 97 while the pin 90 of switch 80 still is cleared within cutout 96, this being a neutral position in which neither of the switches 70 or 80 is operated. As the reciprocation of element 93 in such direction is continued, the pin 90 of switch 80 will be inwardly reciprocated by the corresponding beveled edge 74 to operate switch 80, at which time the crank member 73 has been swung to a position rotating shaft 63 to operate the unit 62 to record an additional count or digit. These positions of the element 93 will be hereinafter referred to as follows: First, the position in which switch 70 is operated, switch 80 is not operated and the unit 62 is readied for a subsequent count will be called the "stand-by" position; Secondly, the position in which neither switches 70 nor 80 is operated and the unit 62 is neither counting nor being readied for counting will be called the "neutral" position; and Thirdly, the position in which switch 70 is not operated, switch 80 is operated and the unit 62 is recording an additional count will be called the "counting" position.

For the sake of illustration, the switches 70 and 80 for each of the devices 400 et seq. have been illustrated in Fig. 1 in conventional electrical fashion and some liberties taken with the configuration by which the elements 93 are represented in order to conform with such showing of the electrical nature of the switches 70 and 80. It will be understood, however, that all of the switches 70 and 80 are illustrated in Fig. 1 as being in the neutral position, with the stand-by position occurring when the elements 93 are reciprocated to the right in Fig. 1, and the counting position occurring when the elements 93 are reciprocated to the left in Fig. 1.

With reference now particularly to Fig. 1, the battery 5 has its negative terminal grounded through conductor 200 and has its positive terminal connected with a positive or "hot" conductive line or lines 201. The ignition switch 6 is coupled in series between the positive supply line 201 and the ignition coil 7 by conductors 202 and 203. The distributor is connected in series between the opposite side of coil 7 and the oppositely grounded spark plug 19 by conductors 204 and 205. Such part of the

6

circuitry is obviously a conventional part of the ignition system of the vehicle. Disabling circuitry for rendering the vehicle's ignition system inoperative by shunting around the distributor 8 and spark plug 19 from the coil 7 to ground includes a conductor 206 coupling the coil 7 with contact *a* of switch 140 and a conductor 207 coupling contact *b* of switch 140 with ground. The switch 140 is operated by coil 41 of relay 40, and such coil 41 is provided with an operating circuit including a connection with ground through a conductor 208 and conductor 207, and a conductor 209 through which a positive voltage may be applied to the coil 41 opposite to its ground connection 208—207.

The remainder of the electrical connections will first be enumerated, and the operation of the system then described. The energizing conductor 209 for coil 41 is connected with the contact *b* of the delayed action switch 150. Contact *a* of switch 150 is coupled by a conductive means 210 with the contacts *a* of each of switches 470, 570, 670, 770 and 870 and by a conductive means 211 with the contacts *a* of each of switches 480, 580, 680 and 780. The resistance 51 is coupled with contact *a* of delay switch 150 and oppositely grounded through a conductor 212. Resistance 51 and contact *a* of switch 150 are also coupled through conductive means 210 and a conductor 213 with contact *b* of relay switch 130.

The contacts *e* of each of seat switches 112, 113, 114, 115 and 116 are grounded. The contacts *d* of each of said switches 122—116 inclusive are coupled through conductive means 214 with one side of coil 21 of relay 20, the other side of coil 21 being coupled through conductive means 215 with the positive voltage supply line 201. Positive line 201 is also coupled with contacts *a* and *d* of relay switch 120. The contacts *b* of seat switches 113, 114, 115 and 116 are coupled with the contact of counter switch 870 by conductive means 251. The contacts *a* of seat switches 113, 114, 115 and 116 are coupled respectively with the contacts *b* of counter switches 470, 570, 670 and 770 through conductive means 216, 217, 218 and 219 respectively. The contacts *c* of seat switches 113, 114, 115 and 116 are coupled respectively with the contacts *b* of counter switches 480, 580, 680 and 780 through conductive means 220, 221, 222 and 223 respectively. There is no connection to contacts *c* of counter switches 470, 570, 670 and 770. Similarly any connection with the contacts *c* of counter switches 430, 580, 680 and 780 may be omitted, if desired, although for purposes of illustration there are shown conductive means 224, 225, 226 and 227 coupled with said contacts 480c, 580c, 680c and 780c leading to the meter box 9 and adapted for connection within the latter with solenoids or the like (not shown) for making a special indicia on the recording ticket or tape (not shown) conventionally employed within meter box 9 for recording fare transactions, it being understood that such connections would indicate on such record which of the counters 400, 500, 600 and 700 had been operated during a particular fare.

The contact *c* of relay switch 120 is coupled with the contact *c* of relay switch 130 by conductive means 228, and the contact *e* of relay switch 120 is coupled with the contact *a* of relay switch 130 by conductive means 229. The coil 31 of relay 30 is grounded as at 230 and has its opposite side coupled by conductive means 231 with the contact *b* of counter switch 970 and the contact *c* of counter switch 880.

The meter switch 10 is coupled in series between positive line 201 and conductive means 232 by a conductor 233. Conductive means 232 from meter switch 10 is coupled with contact *b* of counter switch 980. The contact *b* of counter switch 880 is coupled with positive line 201 through a conductor 234. The contact *c* of counter switch 980 is coupled through conductive means 235 with a conductor 236 leading to the lamp 60, which is oppositely grounded as at 237, and to the conductor 238 which may be optionally provided and leads to the meter box

9 for the same purpose as mentioned in connection with conductors 224-227 inclusive. Contact *c* of counter switch 970 is coupled with contact *a* of counter switch 980 by conductive means 239. Contact *b* of counter switch 870 is coupled with contact *a* of counter switch 880 by conductive means 240. There is no connection to contact *a* of counter switch 970. The lamp 61 is coupled in series between contact *b* of relay switch 120 and ground by conductive means 241 and 242.

Operation

The operation of the system, for which its manner of accomplishing the above-mentioned and other objectives will be apparent, may now be considered. The first condition of operation to receive attention is that of non-fare operation of the taxicab, such as occurs when the operator is looking for a fare or enroute to pick up a passenger. It will be clear that for the ignition system and engine of the taxicab to be operative, the relay switch 140 must be open and the relay coil 41, therefore, deenergized, from which it is further obvious that for the vehicle to be operative no positive voltage can be applied through conductive means 210 to contact *a* and resistance 51 of the time delay switching device 50. Reference to the circuitry associated with the counter switches 470, 570, 670 and 770 and the seat switches 113, 114, 115 and 116 reveals that if any of the counter units 400, 500, 600 or 700 have their operating elements 93 in the neutral position (as illustrated in Fig. 1) and there are no passengers seated on the corresponding seat sections 13, 14, 15 and 16, a positive voltage will be applied from battery 5 through conductive means 201, conductive means 234, the closed contacts *a* and *b* of counter switch 880, conductive means 240, closed contacts *b* and *c* of counter switch 870, conductive means 251, the contact *b* of the appropriate one or ones of the seat switches 113, 114, 115 and 116 to the contact *a* of the latter thence through the appropriate one or ones of the conductive means 216, 217, 218 and 219 to the contacts *b* of counter switches 470, 570, 670 and 770, thence through the contacts *a* of the appropriate one or ones of said last mentioned switches to conductive means 210 and thereby to resistance 51. After the passage of current through resistance 51 for a predetermined period the delayed action switch 150 will close, applying the positive voltage from conductive means 210 through contacts *a* and *b* of switch 150 to coil 41 of relay 40, thereby closing relay switch 140 to shunt around the distributor 8 to ground rendering the vehicle inoperative. From this it will be clear that the elements 93 of counters 400, 500, 600 and 700 must, when passengers are not seated upon the corresponding seat sections 13, 14, 15 and 16, be kept in the stand-by position which readies the counting units 62 of devices 400, 500, 600 and 700 for the next counting operation. When the elements 93 of devices 400, 500, 600 and 700 are moved to their stand-by position, it will be clear that the engagement between contacts *a* and *b* of counter switches 470, 570, 670 and 770 are broken, thereby also deenergizing the above traced energizing circuit for the coil 41 of deactivating relay 40. It will also be apparent that the element 93 of special transaction counter 800 must be kept in stand-by condition breaking contacts *b* and *c* and closing contacts *a* and *b* of counter switch 880, and breaking contacts *a* and *b* and closing contacts *b* and *c* of counter switch 870, in order to prevent either energization of relay coil 31 through conductive means 231 (as occurs when unit 800 is in counting condition) or energization of relay 40 through conductive means 210 (as would occur if the element 93 of unit 800 was between its counting and stand-by positions). Thus, the operator must move the element 93 of device 800 to the stand-by position breaking the contact between contacts *a* and *b* of switch 870 in order for the taxicab to be operative during non-fare conditions.

The movement of the element 93 of counting device 900 to its stand-by condition is assured by running the energizing circuit for the coil 31 of the transfer relay 30 through contacts *b* and *c* of counter switch 870. As will hereinafter be made more clear, whenever a passenger is within the taxicab and riding on a metered fare basis, which represents the great majority of transactions, it is necessary for the meter switch 10 to be closed in order to energize the relay coil 31 by a circuit traceable through contacts *b* and *c* of counter switch 970. Thus, movement of the element 93 of device 900 to its stand-by condition is, as a practical matter, assured so that the unit 62 of counting device 900 will be readied for counting operations.

It may be observed that operation of the taxicab during non-fare conditions with the elements 93 of any of the counting devices 400, 500, 600, 700 or 800 in counting condition is prevented since movement of such elements 93 in the counting position will permit the contacts *a* and *b* of switches 470, 570, 670, 770 and 870 to close thereby energizing the resistance 51 and delay switch 150 through the circuits previously traced. Further, the driver is not likely to attempt to cheat the system by operating the taxicab under non-fare conditions with any of the counting devices 400-900 inclusive in counting condition, since he would thereby become accountable to the owner of the taxicab for another fare recorded by the counting device operated.

In summary, therefore, it will be seen that under non-fare conditions of operation of the taxicab, the operator is forced to return the elements 93 of each of the counting devices 400-900 inclusive to their stand-by condition in which the contacts *b* and *c* of each of switches 470, 570, 670, 770, 870 and 970 are in interengagement and the contacts *a* and *b* of each of said switches are out of engagement with each other.

Assuming next that the taxicab picks up a single passenger for transportation on a metered fare basis. Such passenger must sit upon the rear right seat section 12 as will be hereinafter explained. Assuming he has seated himself upon seat section 12 the seat switch 112 is closed bringing contact *d* thereof into engagement with contact *e* thereof thereby grounding the conductive line 214 and energizing the coil 21 of relay 20 through a circuit traceable from battery 5 through conductive means 201, coil 21, conductive means 214 and seat switch contacts 112*d* and 112*e* to ground. This moves contact *d* of relay switch 120 into engagement with contact *e* and energizes conductive means 229 coupling the latter with the contact *a* of relay switch 130. Contact 130*a* being in engagement with contact 130*b*, line 213 and accordingly cutoff line 210 will be energized to deactivate the taxicab unless further steps are taken. The action required to be taken by the operator is the movement of lever 11 of meter box 9 to activate the working parts of the latter including the closing of meter switch 10. The closing of meter switch 10, assuming the element 93 of counting device 900 is in its required stand-by position, will energize the coil 31 of relay 30 through a circuit traceable from battery 5 through conductive means 201 and 233, closed meter switch 10, conductive means 232, counting switch contacts 980*b* and 980*a*, conductive means 239, counter switch contacts 970*c* and 970*b*, conductive means 231, coil 31 and conductive means 230 to ground. Energization of coil 31 moves contact *b* of relay switch 130 out of engagement with contact 130*a* and into engagement with contact 130*c*. Breaking the engagement between relay contacts 130*a* and 130*b* breaks the previously traced energizing circuit for cutoff line 210. Since relay 20 is maintained energized by the closure of seat switch 112 effected by the passenger sitting upon seat section 12, it is clear that the resulting engagement between relay contacts 130*b* and 130*c* will be of no adverse affect as to energizing cutoff line 210, and that the taxicab may accordingly be operated as long as the meter

switch 10 is maintained closed and the passenger remains seated upon seat section 12.

Should the passenger momentarily shift his weight so as to permit seat switch 112 to open, coil 21 of relay 20 would be deenergized and an energizing circuit for cutoff line 210 would be momentarily completed from battery 5 through conductive means 201, relay contacts 120d and 120c, conductive means 228, relay contacts 130c and 130b, and conductive means 213 to cutoff line 210. The time constant of heating of the resistant 51 is such, however, as to preclude closure of the delay switch contacts 150a and 150b until a current has been passed through the resistant 51 for a predetermined length of time. Accordingly, assuming the passenger returns to a properly seated position upon seat section 12 within a reasonable time, the operation of the taxicab will not be interrupted.

Assuming for the moment that a single passenger gets into the taxicab and attempts to sit upon a seat section other than section 12, for instance, upon seat section 13. The operation of contacts d and e of seat switch 113 would be substantially the same as those above described in connection with seat switch 112. However, seat switch contact 113b would be moved into engagement with contact 113c thereby energizing the cutoff line 210 through a circuit traceable from battery 5 through conductive means 201, conductive means 234, counter switch contacts 880a and 880b, conductive means 240, counter switch contacts 870b and c, conductive means 251, contact 113b, contact 113c, conductive means 220, contacts b and a of counter switch 480, and conductive means 211 to cutoff line 210. This obviously requires the movement of the element 93 of counting device 400 to its counting position, in order to break the engagement between contacts a and b of switch 480. However, such manipulation of the element 93 of counting device 400 by the operator will result in the recording of an extra fare trip for which he will be held accountable to the owner of the taxicab. He will, therefore, insist that the single passenger sit upon seat section 12, rather than seat section 13 (or 14 or 15 or 16).

It may be noted that the counting devices 400, 500, 600 and 700 correspond respectively to the rear left seat section 13, the rear center seat section 14, the front right seat section 15 and the front center seat section 16. It is contemplated that the operator of the taxicab will be held accountable by the owner thereof for four extra fares for each count recorded upon the device 700, for three extra fares for each count recorded upon the device 600 in excess of those recorded upon the device 700, for two extra fares for each count recorded upon the device 500 in excess of those recorded upon the device 600, and for one extra fare for each count recorded upon the device 400 in excess of those recorded upon the device 500. Thus, the operator of the taxicab will have strong reason to insist that passengers entering the taxicab sit upon the seat sections 12-16 inclusive in the preferential order only, a single passenger upon section 12, two passengers upon sections 12 and 13, three passengers upon sections 12, 13 and 14, four passengers upon sections 12, 13, 14 and 15 and five passengers upon sections 12, 13, 14, 15 and 16. Although this arrangement has been found in practice to be the one preferred both for the safety of passengers during an accident and for the safety of the driver from possible attack by a passenger, the actual location of the seat sections 12-16 inclusive could be varied as desired or combined in accordance with the custom of the locale in which the taxicab is used as to charging for extra passengers, the system shown for purposes of illustration being intended for use in localities where a separate additional charge is made for each extra passenger up to and including five.

Accordingly, the circuitry last considered coerces the driver to properly seat the passengers in the taxicab and

also to operate the meter lever 11 whenever one or more passengers are in the taxicab and are riding under metered fare conditions.

In some localities, there is an alternative manner of hauling passengers on a so-called flat rate or fixed fee basis, whereby the passenger rides from a given point to another point for a predetermined sum of money independent of the fare which would otherwise be measured by the meter box 9. In order to prevent fraud by the operator of the taxicab upon the owner thereof with respect to such flat rate transactions, it is necessary to provide a means for counting the same. The device 800 serves this purpose.

As noted above the seating of a passenger upon any of the seat sections 12-16 inclusive will energize the coil 21 of relay 20 by completing the connection thereof with ground through the conductive means 214 and the contacts d and e of the seat switch or switches 112-116 inclusive corresponding to the seat or seats 12-16 inclusive upon which the passenger or passengers are sitting. It was further explained that it then becomes necessary for the transfer relay coil 31 to be energized in order to prevent energization of the cutoff line 210 by the circuit traceable from conductive means 201 through relay switch contacts 120d and 120c, conductive means 229, relay switch contacts 130a and 130b and conductive means 213 to cutoff line 210. Such energization of the coil 31 of transfer relay 30 is accomplished for flat rate transaction passengers by moving the element 93 of the counting device 900 to the counting position which moves the contact b of the flat rate control switching apparatus 880 into engagement with the contact c thereof, thereby energizing the coil 31 through a circuit traceable from the positive supply line 201 through conductive means 234, switch contacts 880b and 880c, conductive means 231, coil 31 and conductive means 230 to ground.

It will thus be apparent that for the taxicab to be operative whenever a passenger is seated upon any of the sections 12-16 inclusive, either the meter switch 10 must be closed or the element 93 of flat rate counting device 800 moved to its counting position. It will be observed that since under most fare systems, extra fare passengers riding during a flat rate transaction do not increase the amount of the flat rate fare, the deactivating circuit for the taxicab above traced through counter switch contacts 880a and 880b is broken when element 93 of the flat rate counting unit 800 is moved to its counting position.

It is significant that after the passengers have alighted from the taxicab subsequent to either a metered fare or a flat rate transaction, the element 93 of the appropriate ones of counting devices 400, 500, 600, 700 and 800 must be returned to their stand-by position in order to deenergize the coil 31 of transfer relay 30. The deenergization of the relay 30 is necessary since the relay 20 will obviously be deenergized upon the alighting of passengers and the opening of the contacts d and e of the seat switches 112-116 inclusive. This is true because deenergization of relay 20 permits switch contacts 120d to return to its normal engagement with switch contact c thereby energizing the conductive means 228 and the relay switch contact 130c, which would in turn energize the cutoff line 210 through contact 130b and conductive means 213 if the coil 31 were permitted to remain energized. From the explanation above, it will be clear that the elements 93 must actually be returned to the stand-by condition, rather than partially shifted into their neutral position, after passengers have alighted.

The next possible fare condition of operation to be provided for is where the taxicab is engaged to haul a message, parcel or the like which does not affect the operation of any of seat switches 112-116 inclusive. It is the custom in connection with such deliveries for the fare to be determined as a metered fare. Since during such type of operation none of the seat switches 112-116

are operated, it is necessary in assuming that the operator counts and records the delivery transaction that means for coercing him to do so are provided which will necessarily be somewhat different structurally than those means provided in the case of passenger type operation. The owner of the taxicab has some check upon the matter of delivery service by virtue of the radio communication system normally existing between the taxicab and a central station by which the location of the taxicab can be requested at any time and its availability for a fare ascertained. However, this of itself has been found insufficient. Accordingly, the "engaged in delivery" lamp 60 is preferably provided externally of the cab for somewhat the same purposes as the "occupied" lamp 61 is provided. The latter lamp 61 is obviously energized whenever a passenger is sitting upon any of the seat sections 12-16 inclusive to energize the relay 20, the circuit for the lamp 61 being traceable from the power line 201 through switch contacts 120a and 120b, conductive means 241, lamp 61 and conductive means 242 to ground. Both of lamps 60 and 61 are provided so that field checkers may ascertain the condition of operation of the cab, to wit, non-fare operation, passenger fare operation or delivery fare operation. The lamp 60 may be energized only by the movement of element 93 of counting unit 900 to its counting position, and only when the meter lever 11 has been operated to close the meter switch 10, the circuit being traceable from battery 5 through conductive means 201 and 233, meter switch 10, conductive means 232, switch contacts 980b and c, conductive means 235 and 236 to lamp 60 and through conductive means 237 to ground. Since the operators of taxicabs are subject to checking and diversion of course or disposition when they are operating in non-fare condition, there will be a strong deterrent to acceptance of a delivery fare without operation of the element 93 of counter device 900 to its counting position and the operation of meter lever 11 to energize lamp 60. Further stimulus for closure of the meter switch 10 during delivery transactions is, of course, furnished by the fact that the operator will need the ticket or record of the metered fare made by the meter box 9 in order to collect from the customer for the delivery.

Fig. 5 shows a possible modification of the system deviating from the preferred circuitry above described in that the relay 40 has been eliminated and the conductor 206 connected directly to contact 150b of the delay switch device 50. It will be noted that the connections of ground line 212 and disabling line 210 with resistance element 51 and contact 150a of the device 50 have been reversed from those shown in Fig. 1, in order to provide the necessary grounding of distributor shunting or disabling line 206 when switch 150 is operated. The operation of the system with this modification will otherwise be obvious to those skilled in the art, although it should be observed that elimination of relay 40 and its switch 140, which were in essence "slaved" to delay switch 150, requires that the latter be of nature adapted to carry the heavy current that may be imposed on conductor 206 when switch 150 is operated to its closed condition.

Fig. 6 shows a second possible modification, wherein the delayed action feature of the system is omitted by the elimination of delay switching device 50 and its switch 150. In such embodiment, disabling line 210 is simply coupled directly to the energizing lead 209 for relay 40, the mode of operation being obvious.

It will thus be apparent that the apparatus of this invention is ideally suited for accomplishing all of the above-mentioned and other important objectives of the invention. It will also be evident, however, that the exact embodiment described for purposes of illustration could be varied in certain respects without departing from the true spirit or intention of the invention. Accordingly, it is to be understood that the invention shall be deemed limited only by the scope of the appended claims.

Having thus described the invention, what is claimed as new and desired to be secured by Letters Patent is:

1. In an electrical control system for a taxicab having a passenger seat, and an ignition circuit including a battery, an ignition coil, a distributor and a spark plug, or their equivalents, operably intercoupled in conventional fashion, the combination of: a normally open, ignition disabling circuit adapted for coupling in shunt arrangement with said distributor and spark plug for rendering said ignition circuit inoperable when the disabling circuit is closed; electrically responsive, disabling switching structure coupled with the disabling circuit for closing the latter when the structure is operated; a control circuit adapted for coupling with said battery and coupled with the structure for operating the structure; a seat switch adapted for operable coupling with said seat for operation of the seat switch when a passenger is seated upon said seat; a control switch; a passenger counter unit; and a manually shiftable element operably coupled with both said counter unit and said control switch for operating the counter unit each time the element is shifted to operate the control switch, the seat switch and control switch being coupled with the control circuit and the latter being operable for operating the structure when the seat switch is operated and the control switch remains unoperated, whereby to coerce the operator of the taxicab to shift the element to operate the counter unit when a passenger is seated upon said seat.

2. In a system as set forth in claim 1, wherein said structure includes a relay having a relay coil and a normally open relay switch adapted to close when the relay coil is energized, the relay switch being coupled in series with the disabling circuit, the relay coil being coupled with control circuit for energization by the latter.

3. In a system as set forth in claim 1, wherein said structure includes a device having an electrically responsive mechanism and a normally open, delayed action switch operably coupled with the mechanism for closing a predetermined period of time after the mechanism is energized, the delayed action switch being operably coupled with the disabling circuit for closing the latter when the delayed action switch is closed, the mechanism being coupled with the control circuit for energization by the latter.

4. In a system as set forth in claim 3, wherein the delayed action switch is coupled in series with the control circuit.

5. In a system as set forth in claim 3, wherein said structure further includes a relay having a relay coil and a normally open relay switch adapted to close when the relay coil is energized, the relay switch being coupled in series with the disabling circuit, the relay coil being coupled through the delayed action switch with the control circuit for energization by the latter when the mechanism has closed the delayed action switch.

6. In a system as set forth in claim 1, wherein said taxicab has a number of additional seat portions, and there is provided an additional seat switch, an additional control switch and an additional passenger counter unit for each of said seat portions respectively, each seat switch and its corresponding control switch being coupled in parallel arrangement with each other seat switch and its corresponding control switch.

7. In a system as set forth in claim 1, wherein there is provided a normally open, seat switching instrumentality adapted for operable coupling with said seat for closing of the instrumentality simultaneously with operation of the seat switch; a first relay having a coil and a normally open relay switch which closes when the coil of the first relay is energized; a second relay having a coil and a normally closed relay switch which opens when the coil of the second relay is energized; a first circuit means adapted for coupling the coil of the first relay with said battery through the instrumentality for energization when the instrumentality is closed; second circuit means

13

adapted for coupling the structure with said battery through said relay switches, the latter being in series; normally open, manually operable, control switching apparatus; a special transaction counter unit operably coupled with the apparatus for registering another count each time the apparatus is operated to close the same; and circuit means adapted for coupling the coil of the second relay with said battery through the apparatus.

8. In a system as set forth in claim 1, wherein there is provided a seat switching device adapted for operable coupling with said seat for operation of the device alternately with the seat switch, and a control switching mechanism coupled with the control switch for operation alternately with the latter, the device and the mechanism being coupled with the control circuit for operating the structure when the mechanism is operated and the device remains unoperated.

9. In a system as set forth in claim 1, wherein the structure is operated whenever electrically energized,

14

the seat switch is normally open and is closed when operated, and the control switch is normally closed and is opened when operated.

10. In a system as set forth in claim 1, wherein there is provided normally closed, manually operable, control switching apparatus coupled in series with the control circuit, and a special transaction counter unit operably coupled with the apparatus for registering another count each time the apparatus is operated to open the same.

References Cited in the file of this patent

UNITED STATES PATENTS

2,150,776	Moles	Mar. 14, 1939
2,509,400	Roswell	May 30, 1950
2,598,348	Butler	May 27, 1952
2,651,465	Higgs	Sept. 8, 1953
2,731,100	Butler	Jan. 17, 1956
2,792,901	Butler	May 21, 1957