May 21, 1957 O. BUTLER 2,792,901

CONTROL FOR THE ELECTRICAL SYSTEM AND METERS OF TAXICABS

Filed Sept. 29, 1952 2 Sheets-Sheet 1

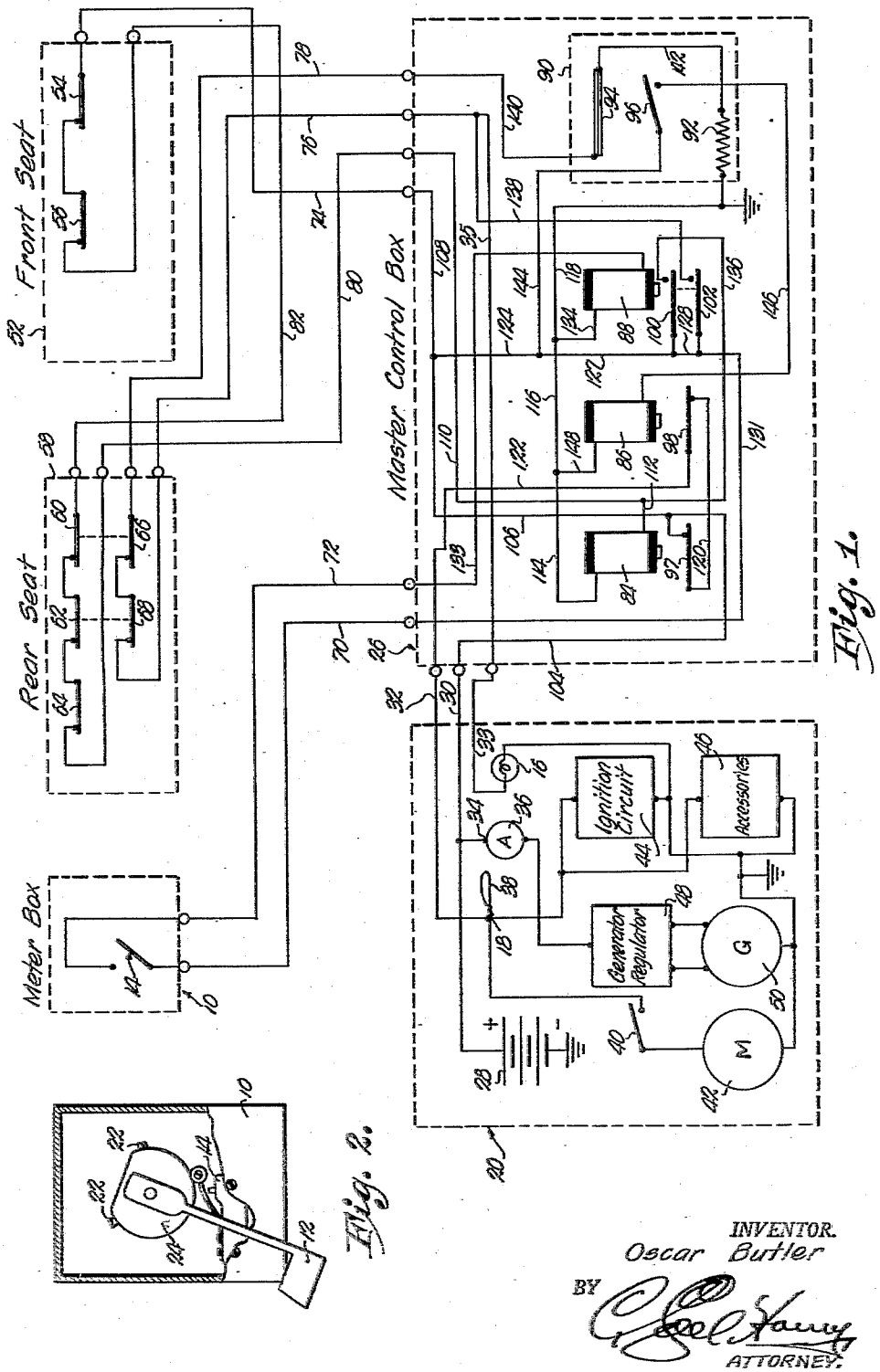


Fig. 1.

Fig. 2.

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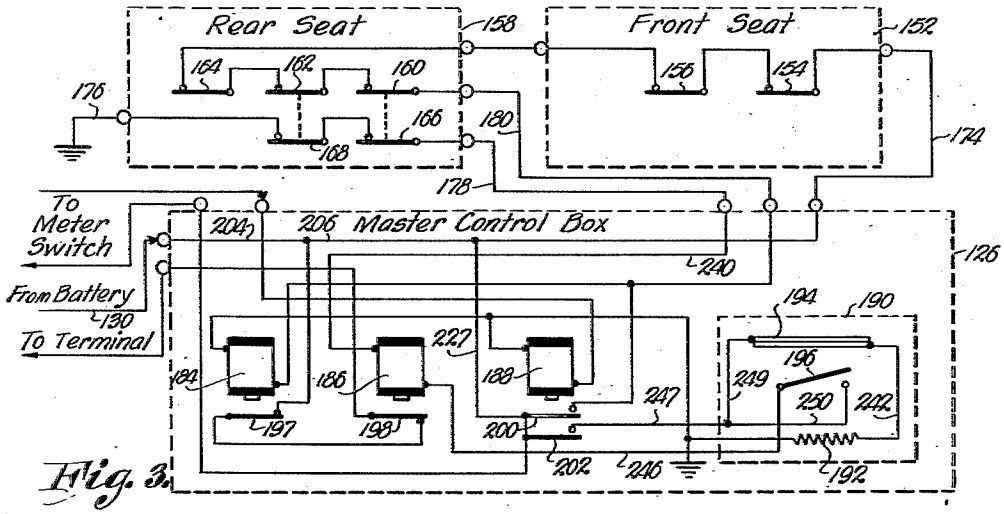


Fig. 3.

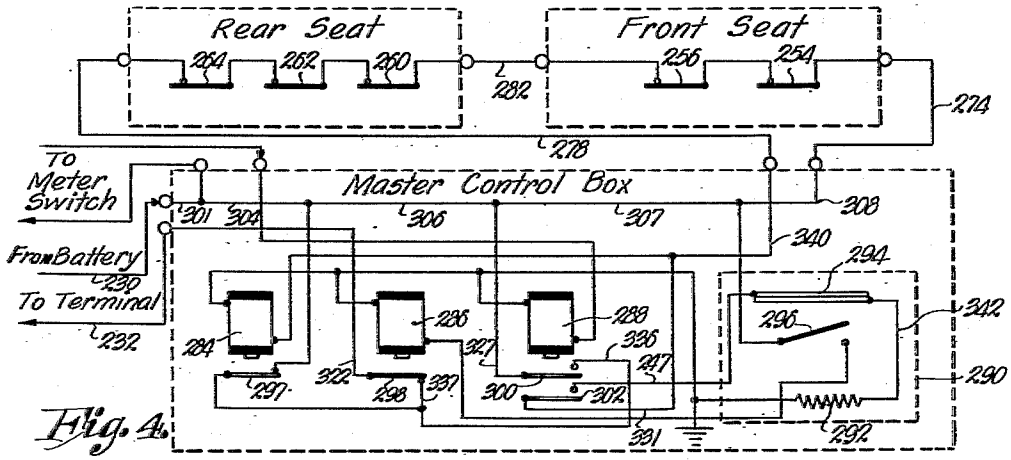


Fig. 4.

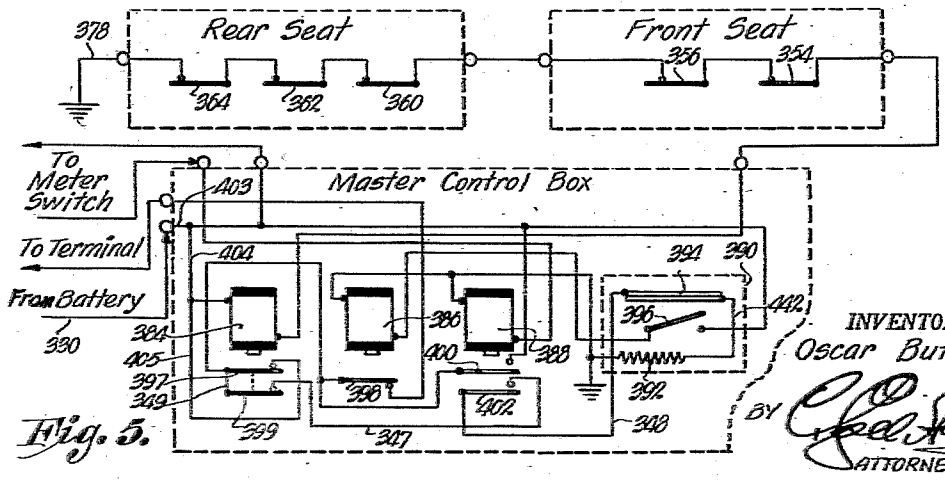


Fig. 5.

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2,792,901

CONTROL FOR THE ELECTRICAL SYSTEM AND METERS OF TAXICABS

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Application September 29, 1952, Serial No. 312,027

8 Claims. (Cl. 180—82)

This invention relates to a control assembly for use in taxicabs and has for its primary object to improve upon the controls of my U. S. Letters Patent No. 2,598,348, dated May 27, 1952, and my co-pending application Serial No. 272,167, filed February 18, 1952, and since issued as Patent No. 2,731,100, dated January 17, 1956, this being a continuation in part thereof.

An important object hereof is to provide a control wherein the entire electrical system of the taxicab is dependent upon proper operation of the meter flag, thereby increasing the difficulty of using "jumpers" in an effort to avoid use of the control.

Another object of the present invention is to provide an assembly permitting use of quickly detachable, sealed plugs whereby the seats of the taxicab may be easily removed as desired.

A further object is to provide an assembly wherein a simple connection may be made to the electrical system of the taxicab which is in turn easily disconnected for normal operation of the taxicab if the control fails to function properly.

A still further object is to provide a controlled seating of passengers in the taxicab, not only to avoid use of the front seat thereof when the rear seat is vacant, but to prevent a single passenger from sitting directly behind the driver where he cannot be easily watch and therefore, be in a better position for robbery.

Other objects include the way in which the control system hereof positively prevents embezzlement of fares; the manner in which it forces closing of the meter immediately upon boarding of a passenger and opening of the meter soon after the taxicab is vacated; the way in which a time delay is provided to avoid effect on the taxicab electrical system when the passengers shift their weight on the seats; the manner of housing the entire control in an easily mounted, single master control box; the way in which the control is associated with the conventional signal lamp used to aid checkers in spotting improper operation by the drivers; and the way in which the meter cam is modified to avoid "beating" the system by manipulation of the meter flag.

In the drawings:

Figure 1 is a schematic wiring diagram, showing the electrical circuit forming a part of the control for the electrical system and meters of taxicabs made according to the present invention.

Fig. 2 is an elevational view of a taxicab meter, parts being broken away to show the modifications thereof made in accordance with the invention.

Fig. 3 is a schematic wiring diagram showing a modified form of the invention.

Fig. 4 is a schematic wiring diagram of another embodiment thereof; and

Fig. 5 is a schematic wiring diagram illustrating a fourth form of the invention.

Taxicabs are conventionally equipped with a meter 10 (Fig. 2) having a flag 12 movable to and from an

operating position and many are provided with a normally open switch 14 that is normally used to ignite a lamp 16 (Fig. 1), and thereby indicate the operation of meter 10. Lamp 16 is usually disposed on the cab roof where it can easily be seen by a checker and is shown within the taxicab electrical system 20 (Fig. 1).

In accordance with the present invention, switch 14 is closed positively by lugs 22 provided on cam 24 that is in turn secured to flag 12 and normally serves as the means for closing switch 14.

The control assembly hereof includes a master control box 26 coupled with battery 28 of system 20 by line 30, with terminal 18 of system 20 by line 32 and with lamp 16 by line 33. The connection between terminal 18 and terminal 34 of ammeter 36 is cut and looped as at 38, thereby rendering starter switch 40, starter motor 42, ignition circuit 44, accessories 46, such as lights, horn, etc., and lamp 16 dependent in operation upon the control assembly about to be described. Ammeter 36, generator regulator 48 and generator 50 are not affected by the disconnection of terminals 18 and 34. Loop 38 may be temporarily rejoined to terminal 34 whenever the control system fails because of needed repair.

In the form of my invention shown by Fig. 1, the front seat 52 of the taxicab is provided with a pair of normally closed switches 54 and 56 and rear seat 58 has normally closed switches 60, 62, 64, 66 and 68. All of these switches may take the form shown and described in my Patent No. 2,598,348, of May 27, 1952, for closing as a passenger sits on the respective seats. No switches are provided beneath the taxicab driver and the arrangement is such that the system 20 cannot be energized when a passenger is seated on seat 52 with the rear seat switches remaining closed. Switches 60 and 66 are ganged for simultaneous opening and closing as are switches 62 and 68 as in my patent. No corresponding switch is ganged with switch 64 to the end that whenever there is a single passenger on seat 58 he must move from directly behind the driver to a position opening switches 62—68 or switches 60—66, otherwise the system 20 cannot be energized, thereby lessening the risk of hold-up.

Such seating control is made possible by the fact that whenever any one of the switches 54, 56, 60, 62 or 64 are opened, meter switch 14 must be closed to energize system 20. But, the closing of meter switch 14 will not have such effect unless either switch 66 or 68 is also closed, all as will hereinafter appear.

Meter switch 14 is coupled with box 26 by lines 70 and 72; series connected switches 54 and 56 are coupled with box 26 by line 74; series connected switches 66 and 68 are coupled with box 26 by lines 76 and 78; and series connected switches 60, 62 and 64 are coupled with box 26 by line 80. Wire 82 couples switches 54 and 56 in series with switches 60, 62 and 64. All connections with meter box 10, master control box 26 and seats 52 and 58 are by plugs as shown for ready removal of the seats from the taxicab as may become necessary.

Within the box 26 are provided three relays having coils 84, 86 and 88, and a thermal unit 90 coupled to ground through a resistor 92 and having a bimetallic element 94 and a normally open switch 96 disposed for closing by element 94 when the latter is energized.

Coils 84 and 86 are provided with normally closed switches 97 and 98 respectively and coil 88 has a pair of normally open switches 100 and 102.

Coil 84 is normally energized to hold switch 97 closed as follows:

From battery 28 through lines 30, 104, 106, 108 and 74, switches 54 and 56, line 82, switches 60, 62 and

64, lines 80, 110 and 112, coil 84, and lines 114, 116 and 118 to ground.

Thus, system 20 is normally energized when the taxicab is empty through switches 97 and 98 as follows:

From battery 28 through lines 30 and 104, switch 97, line 120, switch 98, and lines 122 and 32, terminal 18 and through ignition circuit 44 to ground.

Accordingly, when any one of the switches 54, 56, 60, 62 or 64 is opened, coil 84 is deenergized, switch 97 opened, and the system 20 deenergized, forcing the driver to close switch 14. If switch 66 or 68 is also opened, closing of switch 14 energizes coil 88 as follows:

From battery 28 through lines 30, 104, 106, 124, 127, 128, 131 and 70, switch 14, lines 72 and 133, coil 88, and lines 134 and 118 to ground.

Closing of switch 100 re-energizes coil 84 to reestablish the circuit for system 20 through switches 97 and 98, the circuit for coil 84 now being traced as follows:

From battery 28 through lines 30, 104, 106, 124 and 127, switch 100, lines 136 and 112, coil 84 and lines 114, 116 and 118 to ground.

If the passenger or passengers do not also open switch 66 or 68, closing of switch 102 energizes element 94 as follows:

From battery 28 through lines 30, 104, 106, 124, 127 and 128, switch 102, lines 138 and 76, switches 68 and 66, lines 78 and 140, element 94, line 142 and resistor 92 to ground.

Lamp 16 is coupled in parallel with this circuit by a line 35 joining lines 33 and 138 to the end that closing of switch 102 energizes lamp 16. Heating of element 94 closes switch 96 to energize the normally deenergized coil 86 as follows:

From battery 28 through lines 30, 104, 106, 124 and 144, switch 96, line 146, coil 86, and lines 148, 116 and 118 to ground.

Referring to Fig. 1, electrical system 20 is normally energized through the following circuit: battery 28, lines 30 and 104, switch 97, line 120, switch 98, lines 122 and 32, terminal 18, and through ignition circuit 44 to ground. In this situation, switch 97 is held closed by coil 84, the latter being energized as follows: battery 28, lines 30, 104, 106, 108, 74, switches 54 and 56, line 82, switches 60, 62, and 64, lines 80, 110 and 112, coil 84, and lines 114, 116, and 118 to ground.

When passengers occupy both the front and rear seats, referring to Fig. 1, switches 54, 56, 60, 62, 64, 66 and 68 are opened, thus opening the holding circuit for switch 97, as described in the last paragraph, which in turn creates an open circuit in the system 20. Closing of meter switch 14 energizes coil 88 as follows: battery 28, lines 30, 104, 106, 124, 127, 128, 131 and 70, switch 14, lines 72 and 133, coil 88, and lines 134 and 118 to ground. Energization of coil 88 closes switches 100 and 102, thus restoring the holding circuit for switch 97, as follows: battery 28, lines 30, 104, 106, 124, 127, switch 100, lines 136, 112, coil 84, and lines 114, 116, 118 to ground.

If passengers occupy only the front seat 52, Fig. 1, switches 54 and 56 are opened to create an open circuit in the holding circuit for switch 97, thus creating an open circuit in system 20. Again, closing of meter switch 14 energizes coil 88, closing switches 100 and 102, with the circuit through switch 100 again restoring the holding circuit for switch 97 and the circuit of system 20. However, switches 66 and 68 have not been opened, and thermal unit 90 is energized as follows: battery 28, lines 30, 104, 106, 124, 127, 128, switch 102, lines 138, 76, switches 68, 66, lines 78, 140, element 94, line 142 and resistor 92 to ground. Heating of element 94 closes switch 96 to energize coil 86, as follows: battery 28, lines 30, 104, 106, 124, 144, switch 96, line 146, coil 86, lines 148, 116, 118 to ground. The energization of coil 86 opens switch 98 to create an open circuit in system 20. It is thus necessary for the passenger to shift from front seat 52 to back seat 58 before the cab can proceed.

When a single passenger occupies the rear seat in back of the driver, the same situation develops as in the paragraph above, except that switch 64 only is opened, rather than switches 54 and 56.

When a passenger occupies another portion of rear seat 58, the opening of either or both of switches 60 and 62 breaks the holding circuit for switch 97, opening of which creates an open circuit in system 28. Again, closing of meter switch 14, energizes coil 88 to close switches 100 and 102. Closing of switch 100 restores the holding circuit for switch 97, thus restoring system 20. The opening of switches 66 and/or 68 prevents actuation of thermal unit 90, despite the fact that switch 102 is closed. As long as switch 96 of thermal unit 90 remains open, coil 86 is not energized to open switch 98 in the circuit of system 20.

Therefore, it is clear that as long as one of switches 54, 56, 60, 62, 64 is open, one of switches 66, 68 is open, and meter switch 14 is closed, then electrical system 20 remains intact, and operation of the taxicab is not hindered.

Opening of switch 98 by energization of coil 86, deenergizes the system 20. Obviously, when a passenger departs, re-closing of switches 66 and 68 will energize coil 86, thus forcing the operator to reopen switch 14 to maintain system 20 energized. The delayed action of unit 90 prevents periodic breaking of the circuit through system 20 as a passenger shifts on the seats, tending to cause closing and opening of the seat switches.

It is noted that four lines 74, 76, 78 and 80 are used to join seats 52 and 58 with box 26, whereas in the form of Fig. 3, lines 174, 178 and 180 join seats 152 and 158 with box 126 and line 176 is grounded.

Also, in Fig. 1, coil 86 and switch 96 are coupled in series with battery 28, and switch 102, switches 66 and 68 and element 94 are coupled in series with battery 28.

In Fig. 3 on the other hand switch 202 and element 194 are coupled in series with the battery, and switch 202, coil 186, switches 166 and 168 and switch 196 are coupled in series with the battery.

While electrical system 20 and meter switch 14 are not shown in Figs. 3 to 5 inclusive, the connections thereto are the same as in Fig. 1.

In Fig. 3, the coil 184 is normally energized to hold switch 197 closed through switches 154 and 156 as in Fig. 1. Thus, the taxicab electric system is normally energized through switches 197 and 198 in the same manner as in Fig. 1.

Accordingly, when any one of the switches 154, 156, 160, 162 or 164 is opened, coil 184 is deenergized, forcing the driver to close the meter switch. If switch 166 or 168 is also opened, closing of the meter switch energizes coil 188 as in Fig. 1.

Closing of switch 200 re-energizes coil 184 to reestablish the circuit for the taxicab electric system through switches 197 and 198, the circuit for coil 184 now being precisely as in Fig. 1.

If the passenger or passengers do not also open switch 166 or 168, closing of switch 202 energizes element 194 of thermal unit 190 as follows:

From battery line 130, through lines 204, 206 and 227, switch 202, lines 247 and 249, element 194, line 242 and resistor 192 to ground.

This closes switch 196 to energize coil 186 as follows:

From battery line 130 through lines 204, 206 and 227, switch 202, lines 247 and 250, switch 196, line 246, coil 186, lines 240 and 178, switches 166 and 168 and line 176 to ground.

Opening of the switch 198 by energization of coil 186, deenergizes the taxicab electrical system.

In Fig. 4, switches comparable to switches 66 and 68 and switches 166 and 168 have been omitted and while but two lines 274 and 278 are needed, controlled seating of passengers is not possible.

The circuit for coil 284 through switch 254, 256, 260, 262 and 264 is the same as in Figs. 1 and 3 and need not

be retraced. The circuit through switches 297 and 298 for the taxicab electrical system is also like those of Figs. 1 and 3. Coil 286 is in series with switch 296 as in Fig. 1, and coil 288 is in series with the meter switch as in Figs. 1 and 3.

However, when switch 300 is closed, a secondary circuit for the taxicab system is established through switch 298 as follows:

From battery line 230 through lines 301, 304, 306 and 327, switch 300, lines 336 and 337, switch 298, and line 322 to terminal line 232.

Element 294 of thermal unit 290 receives energy through the seat switches and through switch 302 as follows:

From battery line 230, lines 301, 304, 306, 307, 308 and 274, switches 254 and 256, line 282, switches 260, 262 and 264, lines 278, 340 and 331, switch 302, line 247, element 294, line 342 and resistor 292 to ground.

Otherwise, the control of Fig. 4 operates the same as that of Figs. 1 and 3.

In Fig. 5, in order to avoid connecting line 278 to the master control box 326 as in Fig. 4, it is grounded and coil 384 is provided with a second, normally closed switch 399, switch 397 and switch 398 being series coupled to provide a primary circuit for the taxicab electrical system.

The circuit for coil 384 through switches 354, 356, 360, 362 and 364 is the same as in Figs. 1, 3 and 4 except that it terminates in ground wire 378. Coil 386 is in series with switch 396 of thermal unit 390 as in Figs. 1 and 4, and coil 388 is in series with the meter switch as in Figs. 1, 3 and 4.

Closing of switch 400 establishes a secondary circuit for the taxicab system through switch 398 as in Fig. 4.

However, element 394 is energized through switches 397, 399 and 402 as follows:

From battery line 330, through lines 403, 404 and 405, switch 397, line 349, switch 399, line 347, switch 402, line 348, element 394, line 442 and resistor 392 to ground.

The operation of the form of Fig. 5 is otherwise the same as in the previously described modifications except, as in Fig. 4, the seating of passengers cannot be controlled.

In the embodiments of Figs. 4 and 5, the utility of the element 294 in Fig. 4 and 394 in Fig. 5 and its associated circuitry resides, first, in the fact that the driver is thereby required to open the meter switch 14 after a passenger has gotten out of the vehicle, and secondly, in preventing breaking of the ignition and operating system of the vehicle when the meter switch 14 is closed and a passenger momentarily permits all of the seat switches 254, 256, 260, 262 and 264 or 354, 356, 360, 362 and 364 to close by shifting his weight. Thus, referring to Fig. 4, if the operator closes the meter switch 14 to energize coil 288 while there is no passenger in the vehicle, or if he permits the meter switch 14 to remain closed after all passengers have alighted, the element 294 will be activated through a circuit traceable from the battery through lines 230, 301, 304, 306, 307, 308, 274, closed switches, 254, 256, line 282, closed switches 260, 262 and 264, line 278, line 331, closed switch 302 and line 247 to element 294, which after a reasonable interval will open the switch 296 to deenergize the ignition system by energization of the coil 286 to open switch 298. With regard to the second of the above mentioned functions, it will be clear that the delay feature of the element 294 prevents the immediate deenergization of the ignition system which would otherwise result from energization of the coil 286 to open switch 298 when a passenger shifts his weight to permit all of the switches 254, 256, 260, 262 and 264 to close while the meter switch is also closed during movement of the vehicle.

In summary, the way in which switches 97—98; 197—198; 297—298; and 397—398 are normally closed in series with battery 28 and terminal 18 when meter 10 is not operating and the taxicab is vacant, is the same in all four forms of the invention.

Under such conditions coil 84 is normally energized by closed seat switches 54—56—60—62 and 64; coil 184 by switches 154—156—160—162 and 164; coil 284 by switches 254—256—260—262 and 264; and coil 384 by switches 354—356—360—362 and 364.

Closing of meter switch 14 energizes coils 88, 188, 288 and 388 in the four modifications.

In Fig. 1, closing of switch 96 energizes coil 86; in Fig. 4 coil 286 is energized when switch 296 closes; and in Fig. 5, closing of switch 396 energizes coil 386. However, in Fig. 3, switches 166, 168 and 202 must be closed before coil 186 is energized upon closing of switch 196.

In Fig. 1, closing of switch 100 energizes coil 84 and in Fig. 3, closing of switch 200 energizes coil 184. However, in Fig. 4 a secondary circuit for the electrical system 20 is established when switches 298 and 300 are closed in series with terminal 18, and in Fig. 5, such circuit is closed when switches 398 and 400 are closed in series with terminal 18.

Elements 94, 194, 294 and 394 of units 90, 190, 290 and 390 respectively, are all coupled in a slightly different manner. In Fig. 1, element 94 is in series with switches 66, 68 and 102; in Fig. 3 element 194 is in series with switch 202; in Fig. 4, element 294 is in series with switches 254—256—260—262—264 and 302; and in Fig. 5, element 394 is in series with switches 397, 399 and 402.

Lamp 16 may be energized in the circuits of Figs. 3 to 5 inclusive if desired, as described in connection with Fig. 1, or in any other suitable manner (not shown).

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

1. In a vehicle having a compressible seat, an electrical system, a battery, and a meter provided with a flag movable to and from a position rendering the meter operable, a control assembly comprising a normally open meter switch in series with the battery and connected with said flag for closing as the flag is moved to said position; a pair of normally closed seat switches in series with said battery and respectively connected with different portions of said seat for opening as a passenger sits on the corresponding portion of the seat and compresses the latter; a thermal unit having a bimetallic element and a normally open switch, each respectively in series with the battery, said unit switch being disposed for closing by said element upon energization of the latter; a first relay having a coil and also having a switch which is closed when said coil is energized and open when said coil is deenergized; a second relay having a coil in series with said unit switch and also having a normally closed switch, the switches of said relays coupling said system in series with the battery, the coil of the first relay being in series with the seat switches, whereby said system is deenergized as a passenger sits on either portion of the seat while the meter is open; a third relay having a coil in series with said meter switch and also having a first normally open switch and a second normally open switch, the second switch of the third relay being in series with said element; first circuit means coupled with said battery for energizing said system while either seat switch is open upon closing of the meter switch to energize the third relay and close the first switch of the latter; second circuit means coupled with said battery for energizing said element to close the unit switch upon closing of the second switch of the third relay as the latter is energized upon closing of both seat switches while the meter switch is closed; and third circuit means coupled with said battery for energizing the coil of the second relay upon closing of the unit switch to open the switch of the second relay and thereby deenergize said system when both seat switches and the meter switch are closed.

2. The invention as set forth in claim 1 wherein the means for energizing said element includes a third nor-

mally closed seat switch in series with the second switch of the third relay and mounted for simultaneous opening and closing with one of the first mentioned seat switches.

3. In the invention as set forth in claim 1 wherein the first switch of the third relay couples the coil of the first relay in series with the battery.

4. In a vehicle having a compressible passenger seat, an electrical system, a battery, and a meter provided with a flag movable to and from a position rendering the meter operable, a control circuit comprising a first relay having a normally energized coil and a normally closed switch; a second relay having a normally deenergized coil and a normally closed switch, said switches being in series and coupling the battery in series with said system; a first and a second normally closed seat switch connected with said seat for opening to deenergize said system as a passenger sits on one portion of the seat and thereby compresses the latter; a third normally closed seat switch connected with said seat for opening as a passenger sits on a second portion of the seat and thereby compresses the latter, the first and third seat switches being in series and coupling the battery in series with the coil of the first relay, whereby the latter is deenergized when a passenger sits on either of said portions of the seat; a third relay having a normally reenergized coil, a first normally open switch, and a second normally open switch; a normally open meter switch connected with said flag for closing as the flag is moved to said position, said meter switch being adapted to couple the battery in series with the coil of the third relay, whereby the latter is energized upon closing of the meter switch, said first switch of the third relay being adapted to couple the battery in series with the coil of the first relay, whereby moving of the flag to said position re-energizes said system; and a thermal unit having a bimetallic element in series with the second seat switch, and a normally open switch disposed for closing by said element upon energization of the latter and adapted to couple the battery in series with the coil of said second relay, said second switch of the third relay being adapted to couple the battery in series with said second seat switch and said element, whereby when a single passenger sits on said second portion of the seat, said system is deenergized, and remains deenergized, even after closing of the meter switch.

5. In a vehicle having a compressible passenger seat, an electrical system, a battery, and a meter provided with a flag movable to and from a position rendering the meter operable, a control circuit comprising a first relay having a normally energized coil and also having a normally closed switch which opens when said coil is deenergized; a second relay having a normally deenergized coil and also having a normally closed switch, said switches being in series and coupling the battery in series with said system; a first and a second normally closed seat switch connected with said seat for opening to deenergize said system as a passenger sits on one portion of the seat and thereby compresses the latter; a third normally closed seat switch connected with said seat for opening as a passenger sits on a second portion of the seat and thereby compresses the latter, the first and third seat switches being in series and coupling the battery in series with the coil of the first relay, whereby the latter is deenergized when a passenger sits on either of said portions of the seat; a third relay having a normally deenergized coil and also having a first normally open switch and a second normally open switch; a normally open meter switch connected with said flag for closing as the flag is moved to said position, said meter switch being adapted to couple the battery in series with the coil of the third relay, whereby the latter is energized upon closing of the meter switch, said first switch of the third relay being adapted to couple the battery in series with the coil of the first relay, whereby moving of the flag to said position re-energizes said system; and a thermal unit having a bimetallic element and a normally open switch, said normally open switch of the thermal unit being operably coupled with the element thereof for closing of said last mentioned switch by said element upon energization of the latter, said second switch of the third relay being adapted to couple the battery in series with said element for closing of the switch of said unit, the second switch of the third relay and the second seat switch placing the coil of the second relay in series with said battery, rendering it impossible to energize said system while a single passenger sits on said second portion of the seat.

6. In the invention as set forth in claim 1 wherein the first switch of the third relay is in series with the switch of the second relay.

7. In the invention as set forth in claim 1 wherein the second switch of the third relay is in series with said pair of seat switches.

8. In the invention as set forth in claim 1 wherein the switch of the first relay is in series with said element and wherein said first relay is provided with a second switch in series with the second switch of the third relay, said second switch of the first relay being closed when said first relay is energized and open when said first relay is deenergized.

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