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[54] **MODULAR COUNTING SYSTEM**
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G06m 1/02
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51; 235/92, TC, Q, GA, CW, MT, PC, TE, PK

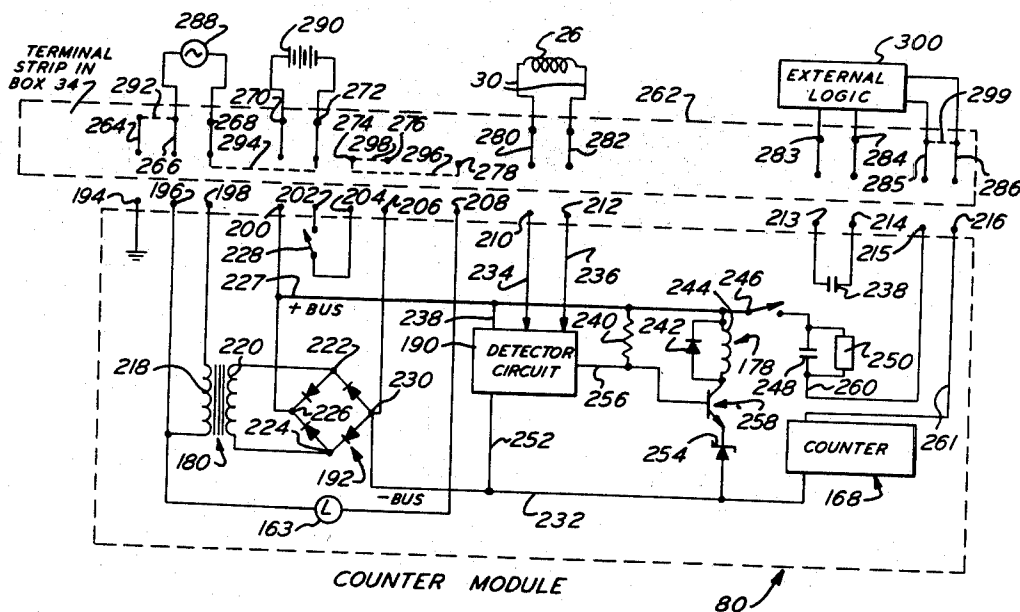
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ABSTRACT: A counter module for a traffic detecting system with alternate AC and DC power inputs, separate on-off switch for each counter, inductive coils for detection, and an output to be used by external logic. The module contains a rectifying circuit and all necessary counting components so that any module may be unplugged and replaced without interfering with the operation of other modules.



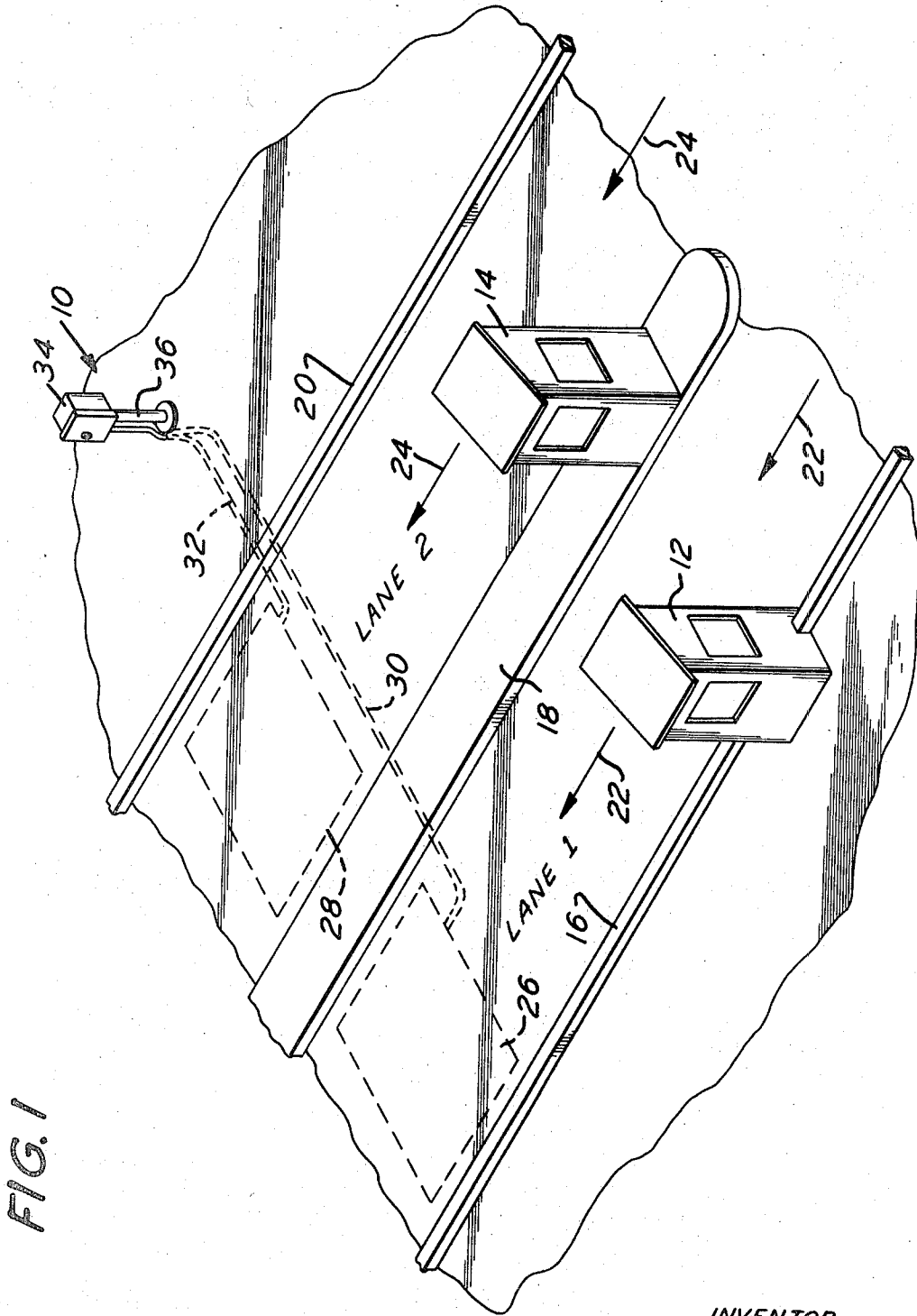


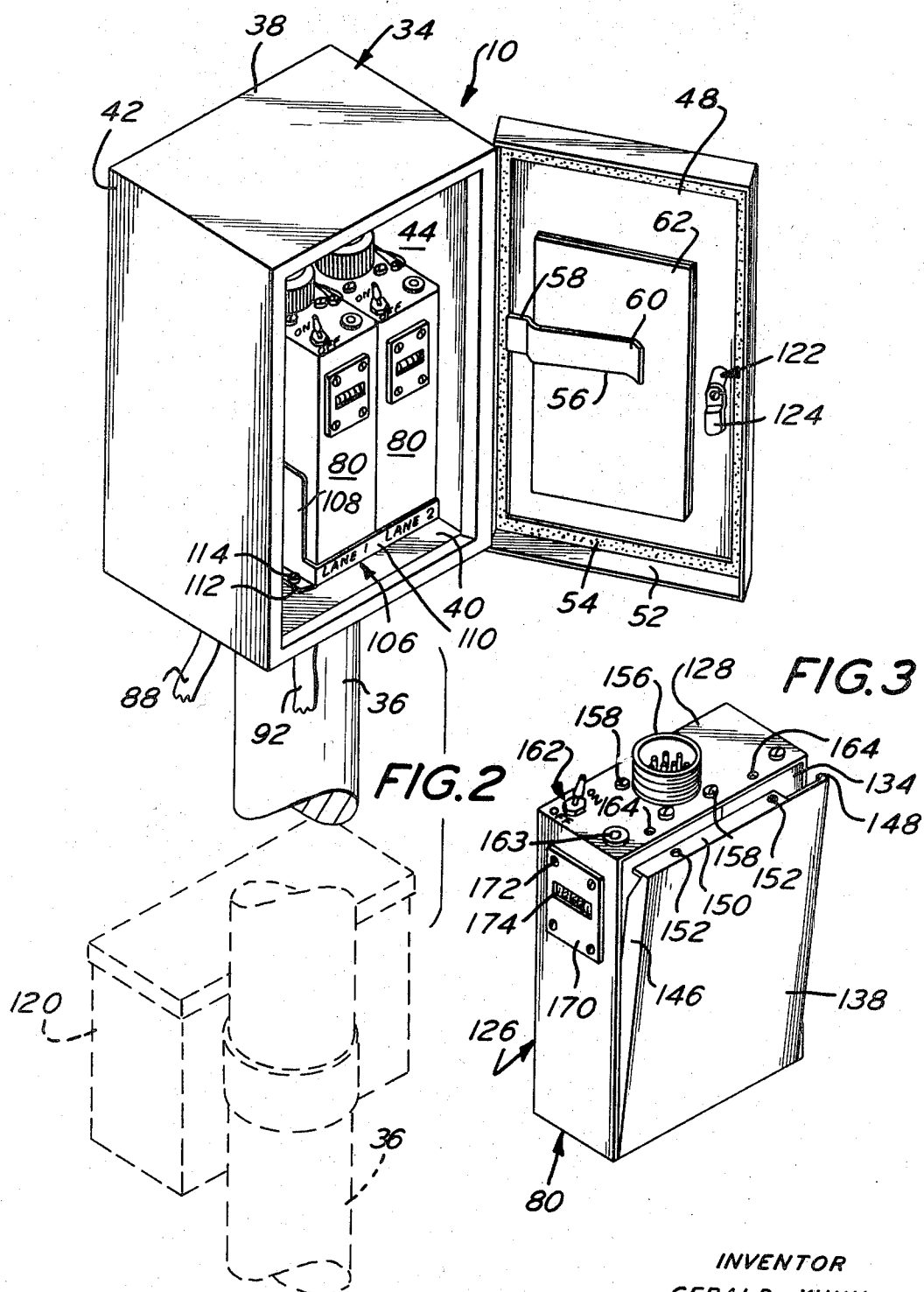
FIG. 1

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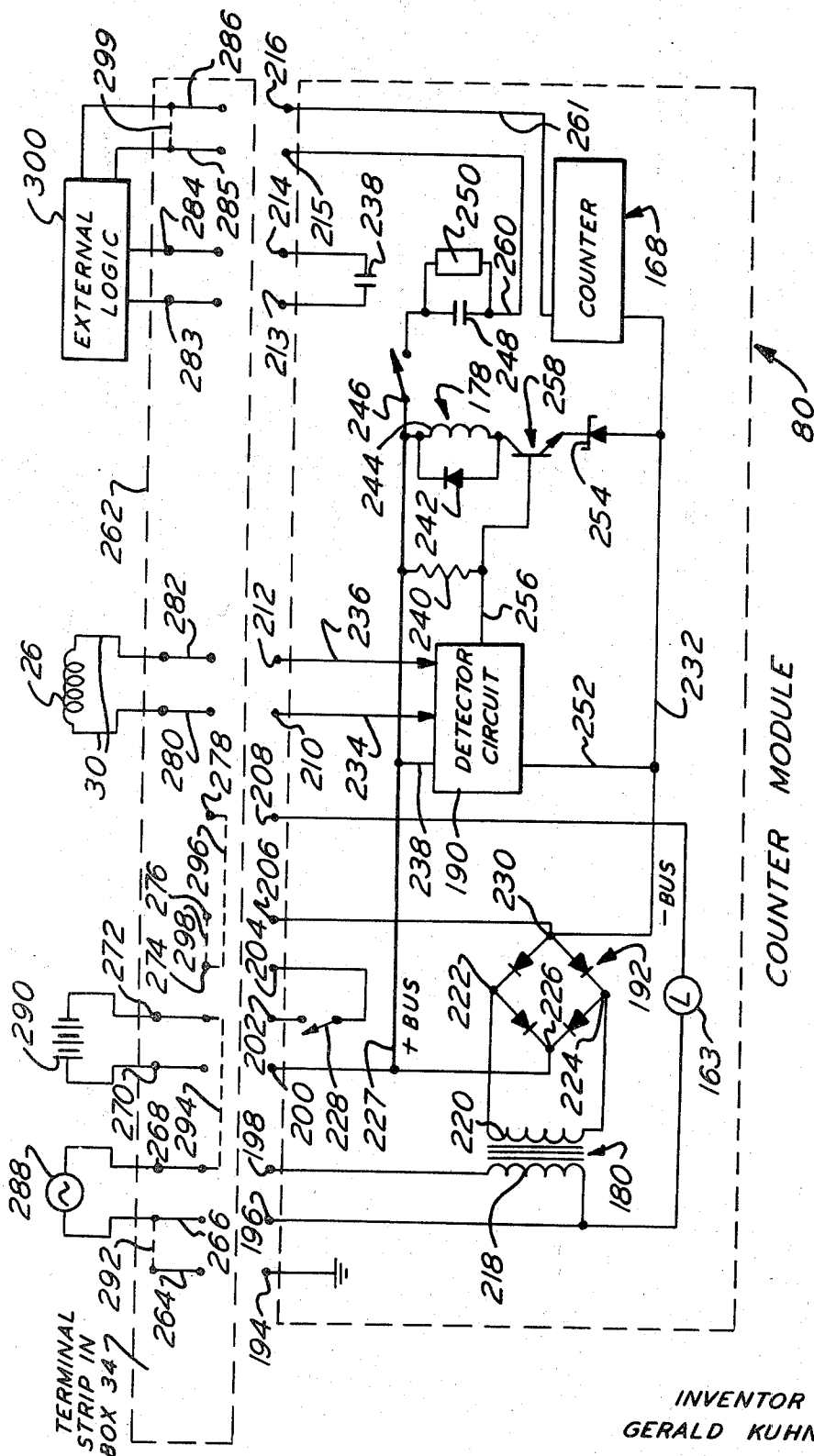


FIG. 8

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MODULAR COUNTING SYSTEM

This invention relates generally to counting systems and more particularly to a modularized counting system having integrated counters built into the detection equipment.

Commercial parking lots for automobiles are always subjected to the possibility of great losses in revenue because the operators or attendants of the parking lots can very easily "pocket" the fees for many parked cars and not report that such extra cars have been parked. It is therefore desirable to provide means for counting the number of vehicles driven into the parking lot so that the number of vehicles reported by the attendant as having parked there can be checked.

However, there are many problems in providing counting apparatus at vehicle parking lots which are adapted to be used at athletic matches or racing events. That is, stadiums for such athletic and racing events are not normally provided with the necessary facilities for maintaining such counting equipment. The inadequacy of electrical power and the wear and tear due to open facilities are exemplary of the problems at such an installation. Therefore, such parking lots require a very sturdy piece of apparatus which as a necessity needs little maintenance and which if defective may be quickly repaired. For the above reasons, parking lots for stadiums and race tracks have in the past found that the installation of such counting apparatus are not only too expensive to install but very expensive to maintain and provide power facilities therefor.

It is therefore an object of the invention to overcome the aforementioned disadvantages.

Another object of the invention is to provide a new and improved counting system. Another object of the invention is to provide a new and improved modularized counting system.

Another object of the invention is to provide a new and improved vehicle detection system having an integrated counter therein.

Another object of the invention is to provide a new and improved vehicle counting system having modules which each include vehicle detectors and integrated counters.

Another object of the invention is to provide a new and improved counting module which may be used with either alternating current or direct current power supplies.

Another object of the invention is to provide a new and improved modularized vehicle detection counter which may be substituted for a similar module merely by unplugging the original module and replacing it with the replacement module.

Another object of the invention is to provide a new and improved counter system which is effective to count automobiles only and which is not stepped to a higher count by detecting extraneous objects.

Another object of the invention is to provide a new and improved counter module which may be used in conjunction with external circuitry for logic functions.

Another object of the invention is to provide a new and improved modularized counting system which requires only unplugging a defective unit and plugging in a new unit to repair said system.

Another object of the invention is to provide a new and improved modularized counting system which inhibits tampering with the circuitry thereof so that the count is always a true representation of the number of vehicles detected thereby.

These and other objects of the invention are achieved by providing a counting module comprising, in a single unit, a detector circuit for generating a signal in response to the detection of a predetermined condition, the detector circuit adapted to generate said signal each time said condition is detected, a counter, means responsive to said signal from said detector circuit for stepping said counter each time said signal is generated and display means associated with said counter for exhibiting the count of said counter.

Other objects and many of the attendant advantages of this invention will be readily appreciated as the same becomes better understood by reference to the following detailed description when considered in connection with the accompanying drawings wherein:

FIG. 1 is a perspective view of a parking lot embodying the invention;

FIG. 2 is a perspective view of a preferred housing for the counting system embodying the invention;

FIG. 3 is a perspective view of a counter and detector module;

FIG. 4 is a front elevational view of the housing for the counting system;

FIG. 5 is a sectional view taken along the line 5-5 in FIG. 4;

FIG. 6 is a side elevational view of a counter module having a sidewall removed;

FIG. 7 is a sectional view taken along the line 7-7 in FIG. 6; and

FIG. 8 is an electrical schematic diagram of the modular counting system.

Referring now in greater detail to the various FIGS. of the drawing wherein similar reference characters refer to similar parts, a modular counting system generally referred to at 10 in FIG. 1 is shown in use in a vehicle parking lot.

The counting system 10 is shown in use in conjunction with two incoming lanes of a parking lot. The parking lot includes a first and second toll house 12 and 14, respectively, which are located adjacent incoming lanes 1 and 2, respectively. The first lane preferably includes cement strips 16 and 18 which border the lane and prevent automobiles from leaving the lane prematurely.

The second lane includes, in addition to cement strip 18 on its left border, a cement strip 20 on its right border. These strips act to prevent an automobile from leaving lane 2 prematurely. Automobiles enter lanes 1 and 2 in the directions of arrows 22 and 24, respectively. The houses 12 and 14 are located on strips 16 and 18 out of the way of the vehicles. The toll houses 12 and 14 are used by the attendants to collect the parking fee as automobiles enter the parking lot.

Located slightly below the surfaces of lanes 1 and 2 and several feet beyond the toll houses 12 and 14, are inductive loops 26 and 28, respectively. The inductive loops 26 and 28 are each comprised of continuous loops of wire which are suitably disposed in a rectangular pattern as shown in phantom in FIG. 1. In the preferred embodiment, inductive loop 26 is comprised of a single turn whereas the loop 28 is comprised of two turns. The difference in turns is provided to eliminate interference between the counting modules for each of the lanes. The inductive coils 26 and 28 are connected to the counting system via leads 30 and 32, respectively, which are also shown in phantom.

As best seen in FIGS. 2 and 4, the counting system 10 is housed in a generally rectangular box 34. Box 34 is conventionally mounted at the top of an upstanding cylindrical pole 36.

Box 34 includes a horizontally disposed rectangular planar top wall 38, a horizontally disposed planar rectangular bottom wall 40, a pair of vertically disposed rectangular planar sidewalls 42 and 44 and a vertically disposed rectangular planar rear wall 46. Box 34 also includes a pivotally mounted rectangular cover 48. As best seen in FIG. 5, the cover 48 is pivotally connected to the forwardmost edge of sidewall 44 by a vertically extending hinge 50. The door 48 thus is pivotable about a vertical axis through hinge 50.

The cover 48 is substantially planar and is disposed in a vertical plane and includes a peripheral flange 52 which extends along each of the edges of the cover 48 in a direction inwardly of the box 34 and is perpendicular to the major portion of the cover 48. The flange 52 is adapted to overlap the forwardmost edges of the walls 38, 40, 42 and 44 of the box 34 when the cover is closed against the box 34. In this manner, the box 34 is protected against water seepage to the internal portion thereof.

Cover 34 also includes insulation strips 54 which are preferably secured by an adhesive bonding at the inner surface of the major rectangular portion of cover 48 inwardly of and extending adjacent and along the flange 52. The inside surface of cover 48 also includes a strap 56. Strap 56 extends horizontally and is connected at a first end 58 to the inner surface of cover 48 and is spring urged at its other end 60 against said inner surface. Strap 56 is adapted to hold a pad or sheet of

paper 62 for ready access to a supervisor or other authorized official so that he may record the latest count on the counters provided within the box 34. The end 60 of the strap 56 may be drawn away manually from the inner surface so that the pad may be easily inserted and removed.

As best seen in FIG. 5, wall 44 of box 34, as well as each of the remaining walls of the box, are constructed in such a manner that they have a metallic outside and inside wall 64 and 66, respectively, which are separated by a full layer of insulation 68. Similarly, cover 48 includes an outer wall 70 and an inner wall 72 which are both preferably metallic and which are separated by a full layer of insulation 74. The construction of the walls of box 34 and the cover 48 effectively insulate the circuitry housed within box 34 so that circuitry within the box is not subjected to the temperature extremes to which the outside of the box is subjected. The metallic walls also include flanges, as seen in FIG. 5, to completely enclose the insulation used within the walls.

Box 34 has housed therein a fuse box 76, a terminal strip 78, a pair of counting modules 80 and the associated circuitry connected therebetween. Fuse box 76 includes a first fuse 82 associated with lane 1 and the counting module associated therewith and a second fuse 84 which is associated with the second lane and the counting module associated therewith.

The terminal strip 78 is secured to the inner surface of wall 46 and is disposed vertically. The terminal strip 78 enables the connection of the power supply and the leads 30 and 32 from inductive loops 26 and 28 to the appropriate terminals of the counting modules 80. The terminal strip 78 includes jumper straps 86 which are connected between appropriate terminals of the terminal strip 78 to enable AC operation when connected in a first position and DC operation when connected in another position.

The incoming power leads are connected as a cable 88 and are connected through a conduit connector 90 to various terminals of terminal strip 78. Similarly, the leads 30 and 32 from the inductive coil are connected as a cable 92 via a conduit connector 94 to various other terminals of terminal strip 78. The fuses 82 and 84 are connected via an electrical cable 96 to various terminals on the other side of terminal strip 78. The terminals are also connected via cables 98 and 100 to the electrical plug connectors 102 and 104, respectively. The connectors 102 and 104 each include a female portion and a male portion each having a plurality of aligned terminals. The female portions of connectors 102 and 104 are connected permanently to the leads of cables 98 and 100, respectively. The male portions of the connectors 102 and 104 are secured to the modules 80 and are in turn connected to various portions of the circuitry located within the modules 80. The connectors 102 and 104 are preferably of the bayonet type and the female portions thereof include a rotatable collar which is threadedly secured to the male portion for insuring a good electrical connection between the male and female terminals thereof.

The modules 80 are positioned within the box 34 by a mounting bracket 106 which is best seen in FIG. 2. The mounting bracket 106 is basically L-shaped and includes a vertically disposed planar leg 108 which is substantially rectangular and a planar elongated strip 110 which is perpendicular to the planar leg 108. The planar leg 108 also includes an integral horizontally disposed perpendicular flange 112. The flange 112 includes a pair of openings through which threaded fasteners 114 extend for threadedly fastening the mounting bracket 106 to the lower wall 40 of the box 34. The planar leg 108 also includes an integral vertically disposed flange 116 which is also perpendicular thereto and which includes a pair of openings through which threaded fasteners 118 extend to threadedly fasten the mounting bracket to the rear wall 46 of the box 34. The bracket 106 is so dimensioned as to cause the pair of modules 80 to fit snugly within.

It should be noted that the strip 110 includes the legends "Lane 1" and "Lane 2" which are provided adjacent the appropriate counting modules 80. Thus, the counting module on the left registers the number of cars sensed in lane 1 and

similarly, the counting module 80 on the right registers the number of cars counted in lane 2.

The counter system 10 is optionally provided with a direct current source of voltage which is shown in phantom in FIG. 2. The DC source of voltage is encased in an all-weather protected box 120 which is located adjacent the lowermost portion of the pole 36. The preferred type of a DC source is a plurality of conventional 12 volt automobile batteries which are rechargeable.

The outer cover 48 of box 34 includes a locking mechanism 122. Locking mechanism 122 is preferably key operated and includes a rotatable finger 124 which is adapted to engage a flange (not seen) which projects inwardly from wall 42 for locking the cover to the box. The rotation of the locking finger 124 is enabled only by insertion of a key into the locking mechanism 122. The lock insures that the counting modules 80 are not tampered with by unauthorized persons.

The module 80 is shown in greater detail in FIGS. 3, 6 and 7. The entire counter module 80 is housed in a generally rectangular case 126. The case 126 includes an integral top wall 128, a horizontally disposed rectangular wall 130, a rectangular vertically disposed rear wall 134 and a vertically disposed rectangular sidewall 136. Case 126 also includes a removable rectangular vertically disposed sidewall 138.

The bottom wall 130 includes a vertically disposed upwardly extending integral flange 140 which extends along the exposed edge of wall 130. The removable sidewall 138 includes a bracket 142 which is horizontally elongated and extends between but intermediate of the side edges of the wall 138. The bracket 142 includes an outstruck portion 144 which is spaced from the inner surface of wall 138 approximately the thickness of the flange 140.

As best seen in FIG. 3, the removable wall 138 includes a pair of integral vertically elongated perpendicular flanges 146 and 148. Flanges 146 and 148 extend inwardly of the case 126. Finally, the wall 138 also includes along its uppermost edge a horizontally disposed perpendicular flange 150 which extends inwardly of the case 126. The flange 150 includes a pair of openings 152 adjacent which are secured collars 154. Collars 154 are axially aligned with the openings 152 and include aligned bores which are threaded therein.

The top wall 128 includes a circular opening through which a male portion of an electrical connector is mounted. The top wall 128 also includes four symmetrically spaced openings about the opening for the male portion 156 through which threaded fasteners 158 extend and are threadedly fastened to an integral collar of the male connector 156.

The top wall 128 also includes an opening through which a toggle switch 162 is mounted. As will hereinafter be seen, toggle switch 162 enables the switching on and off of power to the individual module. Provided along the free edge of top wall 128 are a pair of openings 164 which are aligned with openings 152 when the removable wall 138 is placed in a closed position with respect to the wall 128 as best seen in FIG. 7. Openings 164 accommodate passage of threaded fasteners 166 which extend therethrough and are threadedly secured in the collars 154 adjacent openings 152. When opening the case 126 to have access to the circuitry, the threaded fasteners 166 are removed thereby enabling the removable wall 138 to be swung outwardly about a horizontal axis at the lowermost end of the wall 138.

The front wall 132 includes a rectangular opening in which a counting unit 168 is mounted. The counting unit 168 includes a rectangular display plate 170 which is larger than the opening in front wall 132 and which includes four openings through which threaded fasteners 172 extend to fasten the counter to the front wall 132. The display plate 170 of counter 168 includes a rectangular horizontally elongated window 174 through which the numerical display wheels of counter 168 may be viewed. The display wheels of the counter are adapted to show the count to which the counter 168 has been stepped at all times.

As best seen in FIG. 2, the toggle switch 162 of each of the modules 80 includes the legends "On" and "Off" adjacent thereto to enable the attendant to quickly establish the operating status of the counting modules. A lamp 163 which is best seen in FIG. 3 is provided adjacent toggle switch 162 and provides a further visual indication of whether the power is being supplied to the logic module 80. Lamp 163 is, however, used only with an AC power source, in that the drain of the lamp is greater than the drain of the solid state circuitry used within the logic module and thus would considerably shorten the length of operation of the counters between charges of the batteries used for the DC voltage supply.

Also secured within the case 126 is a printed circuit board 176 which comprises the detector circuitry, a relay 178 and a transformer 180. Various interconnecting circuits have not been shown for purposes of clarity.

As best seen in FIG. 7, the sidewall 136 includes a pair of indented portions 182 through which elongated threaded fasteners 184 extend. Fasteners 184 enable the securement of the printed circuit board 176 within the module. The printed circuit board 176 includes a pair of opening which are aligned with the openings in the indented portions 182 and are adapted to receive the shafts of threaded fasteners 184. The printed circuit boards 176 are spaced from the sidewall 136 by a pair of collars 188 which are cylindrical and are adapted to be telescoped over the shafts of the threaded fasteners 184 without permanent fastening therebetween. A pair of cylindrical collars 190 having threaded barrels are mounted on the opposite side of the printed circuit boards 176 and are threadably secured to the shaft to lock the printed circuit board between the collars 190 and the collars 188. Relay 178 is mounted to the inner surface of wall 136 and transformer 180 is secured to the lower surface of top wall 128 and depends therefrom. The transformer 180 is secured thereto by threaded fasteners 186.

The electrical circuitry is diagrammatically illustrated in FIG. 8. The counter module 80 basically includes, in addition to lamp 163, counter 168, relay 178 and transformer 180, a detector circuit 190, a full wave rectifier 192 which is preferably comprised of four diodes and associated circuitry. As seen in FIG. 8, the counter module includes a plurality of terminals 194 through 216 each of which is connected to a specific portion of the circuit. Terminal 194 is connected to ground. Terminals 196 and 198 are connected to opposite sides of the primary winding 218 of transformer 180. Terminal 196 is also connected to a first side of lamp 163. The first side of the secondary winding 220 of transformer 180 is connected to a first junction 222 of rectifier 192. The opposite side of winding 220 is connected to junction 224 of rectifier 192. Terminal 200 is connected to junction 226 of rectifier 192 and to a positive bus line 227.

Terminal 202 is connected to terminal 204 via a normally open switch 228. Terminal 206 is connected to the remaining junction 230 of rectifier 192 which is in turn connected to a negative bus 232. Terminal 208 is connected to the other side of lamp 163. Terminals 210 and 212 are connected to input lines 234 and 236, respectively, of detector circuit 190 and terminals 213 and 214 are connected to opposite sides of normally open contacts 238 of relay 178.

The positive bus is connected via line 238 to detector circuit 190, to resistor 240, to diode 242, to coil 244 of relay 178 and via a normally open switch 246 to normally open contacts 248 of relay 178 and arc suppressor 250. The negative bus 232 is connected to detector circuit 190 via line 252, to a Zener diode 254 and to counter 168. Detector circuit 190 includes an output line 256 which is connected to resistor 240 and to the base of transistor 258. Transistor 258 is preferably of the NPN type.

Contact 215 is connected via line 260 to contacts 248 and arc suppressor 250. Contact 216 is connected to counter 168 via line 261.

The collector of transistor 258 is connected to the coil 244 of relay 178 and diode 242. The emitter of transistor 258 is

connected to Zener diode 254. The diode 242 is provided in parallel with the coil 244 of relay 178 to suppress transient feedback voltage when the field across the relay coil 244 is collapsed by a switching off of the transistor 258. Arc suppressor 250 is comprised of an RC circuit which suppresses any arcing across the contacts 248 when they are opened.

The terminal strip in box 34 is schematically illustrated within dotted line 262. For purposes of clarity, the terminals included in the terminal strip have been aligned vertically with the terminals of the counter module 80 to which the terminals are connected via a cable 98 or 100. Thus, the terminal strip includes terminals 264 through 286. Each of the terminals 264 through 286 can only be connected to the terminals 194 through 216 of the counter module 80 which is in vertical alignment therebelow. However, it should be understood that not all of the terminals of the terminal strip and the counter module need be connected simultaneously for each operation.

An AC power source 288, when used, is connected to terminals 266 and 268. A DC source 290, when used, is connected to terminals 270 and 272. The leads 30 which are connected to inductive loop 26 are connected to terminals 280 and 282 of the terminal strip. The input lines of external logic 300, when used are connected to terminals 283 and 284 of the terminal strip. Similarly, the output lines of external logic 300, when used, are connected to terminals 285 and 286.

The electrically conductive straps are shown in dotted lines and are thus used only for specific types of operations. For example, jumper strap 292 is connected between terminals 264 and 266 and is used only in conjunction with an AC source. Similarly, strap 294 is connected between terminals 268 and 272 and strap 296 which is connected between terminals 274 and 278 are also connected only in conjunction with the use of an AC source. Strap 298 which is connected between terminals 274 and 276 is provided only in conjunction with the use of a DC source of voltage. Finally, strap 299 is connected between terminals 285 and 286 only when the external logic 300 is not used.

When an AC source 288 is used to power the counter module 80, the following terminals are connected to the associated terminals of the counter module: Terminals 264, 266, 268, 274, 278, 280, 282, 285 and 286.

Switches 228 and 246 are normally open. Both are controlled by the "On-Off" toggle switch 162. When the toggle switch 162 is switched to its "On" position, switches 228 and 246 are closed, thereby turning the counter module 80 on as power is applied thereto. The toggle switch 162 is thus a double pole, double throw electrical switch with switches 228 and 246 each representing a single pole.

If external logic 300 is used with the counter module, for example to determine the direction that a vehicle is traveling, terminals 283 and 284 are also connected to terminals 214 and 216 of the counter module. Strap 299 would therefore be removed as a jumper between terminals 285 and 286. The counter 168 would thus be stepped when using logic 300 if the direction in which the automobile is travelling is the correct direction. In the AC mode, as hereinbefore noted, straps 292, 294 and 296 are connected as shown in the drawing.

When a direct current source, such as source 290, is utilized to power the counter module 80, terminals 270, 272, 274, 276, 280, 282, 285 and 286 are connected to the associated terminals of the counter module. Again, it should be noted that if the external logic is utilized with the counter module, terminals 283 and 284 are also connected to the counter module and strap 299 removed.

In operation with an alternating current source, the power is supplied via transformer 180 to the full wave rectifier 192 which in turn provides a positive voltage to the positive bus line 227. A less positive voltage is applied via junction 230 to the negative bus line 232. Where a DC power source is utilized, DC source 290 is connected via terminals 270 and 272 of the terminal strips to terminals 200 and 202 of the counter module 80 and then directly to bus lines 227 and 232, respectively. Thus, where powered by an AC or DC source, the bus

lines 227 and 232, respectively, receive a positive and less positive DC signal. The output line 256 of detector circuit 190 is normally conductive and the voltage thereon is therefore substantially at the potential applied on bus line 232. The detection of a vehicle over the inductive coil 26 causes the detector circuit 190 to produce a higher voltage on line 256 and there is a resultant loss in conduction. The higher voltage is applied to the base of transistor 258 and thereby causes the emitter base junction to be forward biased which causes the transistor 258 to go conductive. The conduction of transistor 258 causes a surge of current through the relay coil 244 which closes the normally open contacts 238 and 248. The closing of contacts 248 in turn causes the counter 168 to have a voltage applied thereacross which increments by "1" the count in the counter 168. That is, if the external logic was not being used, contacts 248, line 260, strap 299 and line 261 connect the counter 168 to the positive bus line 227.

Where external logic 300 is used and controlled by the counter module 80, the energization of relay coil 244 enables the closing of contacts 238 to be used for control purposes. A preferred control purpose is to prevent the counter 168 from being incremented unless the direction that the automobile is travelling is correct. Thus, if the closing of contacts 238 is not in the proper sequence, which would indicate to the logic 300 that the automobile is travelling in the wrong direction, the output lines of logic 300 remain in open circuit. The closing of contacts 248 does not, therefore, enable the counter 168 to be incremented. If, however, contacts 238 are closed in the proper timed relationship in comparison with relay contacts of another module, the external logic 300 recognizes this condition and causes a closed circuit between its output lines. The closing of the circuit between the output lines of logic 300 causes a completed circuit between lines 260 and 261 which thereby enables the closing of contacts 248 to increment the counter 168.

It can therefore be seen that when using external logic 300 in conjunction with a detector in another module for the purpose of determining the direction in which the automobile is travelling, the counter 168 is incremented or stepped to count the vehicles travelling in the correct direction. In the parking lot shown in FIG. 1, the counter can therefore be stepped only when an automobile is travelling into the parking lot.

In addition to external logic being connected to terminals 213 and 214, it should be understood that external counters or other external circuits may be controlled each time an automobile is detected.

When an automobile has passed over and beyond the inductive coil 26, the detector circuit causes the output signal on line 256 to again go conductive and thereby cause the voltage thereon to again approach the signal level on bus line 232.

It should be noted that the operation of the counter module is such that the relay coil 244 is energized only upon detection of an automobile over the inductive coil 26. Thus, when a DC source of power is used, the drain incurred via the relay 244 is present only when the automobile is detected over the inductive coil. The current drain of the solid state circuitry is very minimal during the remainder of the operation of the counter module, thus providing very efficient operation of the counter module.

It should also be noted that by provision of the transistor stage 258, a power failure does not cause any change of state in the relay 178 with a consequent change in the count of counter 168. That is, in conventional systems, the relay coil is normally connected directly to the output of the detector circuit 190 thereby energizing the relay coil 244 except when an automobile is being sensed. Upon the automobile's passing over and away from the inductive coil, the detector circuit is again energized thereby again energizing the relay which can then be used to step a counter.

Thus, where power is lost, the normally energized relay is deenergized and the return of power to the detector circuit causes the counter to be stepped even though a car has not been sensed by the inductive coil 26. Thus, it can be seen that

the provision of the transistor 258 and the associated circuitry as an intermediate buffer between the detector and the relay coil enables more efficient operation of the counter module and prevents power failure from affecting the count in the counter.

It can therefore be seen that a versatile modularized counting system has been provided. The counter modules can be plugged into a system wherein either a conventional AC power source or a direct current voltage source is used. Moreover, nonsinusoidal alternating inputs may be applied via input terminals 196 and 198 to the input of the system without affecting the operation. Further, the module may be employed in conjunction with external logic or circuitry which can be controlled by the counter module due to the provision of the normally open contacts 238 which are controlled by the relay coil 244 of relay 178. Thus, where the determination of the direction of movement of an automobile in a lane is necessary, the counter module may be used to supply a portion of such information.

It should be noted that, in addition to the foregoing, the module has the following advantages:

Because the module is a unitized structure, a defective module need only be unplugged and a replacement module replaced therefor and the counting system is completely repaired. The module may then be taken back to the manufacturer for repair thereof without any discontinuation in service at the site of the operation.

The integral packaging of the counter and detector circuit in a single unit prevents tampering by either vandals or attendants at the parking lot. Moreover, no adjustments need ever be made to insure the detector circuit causes stepping of the counter in that the detector circuit and counter are never separated and are therefore balanced by the manufacturer.

As hereinbefore set forth, one type of module may be used in a plurality of operations in conjunction with external circuitry.

Due to the provision of relay contacts 238, the module may be used in conjunction with a similar module and external logic circuitry so that the counter associated with the module counts only vehicles travelling in a predetermined direction.

Since each module includes an "On-Off" switch, unnecessary current drain is prevented when less than two lanes are used in conjunction with the counting system. That is, where only one of the lanes is used, the module associated with the unused lane may be turned off without turning off the counter associated with the lane being used. Both the counter and the power supply of the module are turned off by the flipping of the toggle switch to the "Off" position. Where a conventional AC source is used and current drainage is relatively minor, the lamp 163 provides a quick visual indication that the counter is in operation.

Without further elaboration, the foregoing will so fully illustrate my invention that, others may, by applying current or future knowledge, readily adapt the same for use under various conditions of service.

I claim:

1. A counting system in combination with an inductive coil for detecting automobiles, said inductive coil being located adjacent a lane for an automobile, the inductance of said inductive coil being changed each time an automobile passes over said coil, said counting system including a detector circuit for generating a signal in response to a change in inductance of said inductive coil, said detector circuit adapted to generate said signal each time said condition is detected, a counter, means responsive to said signals from said detector circuit for stepping said counter each time said signal is generated, said means responsive to said signals from said detector circuit for stepping said counter including an electronic switch comprised of a transistor and a relay, the base of said transistor being connected to the output of said detector circuit and the collector of said transistor being connected to the coil of said relay so that said relay is energized upon detection of said change in inductance as the signal from said detector

causes conduction of said transistor, said relay including normally open contacts that are closed only upon energization of said relay, said contacts applying a stepping signal to said counter each time said contacts are closed, said relay being energized only when said transistor amplifier is driven conductive so that loss of power to said counting system cannot cause a spurious stepping of said counter, display means associated with said counter for exhibiting the count of said counter, switching means associated with said means responsive to said signals from said detector circuit for stepping said counter, said switching means adapted to be switched in state each time said counter is stepped so that external circuitry may be controlled by said control module, a power transformer and a full wave rectifier having a positive and a less positive output line, said transformer forming a first input for an alternating current power source, said rectifier being connected to the output of said transformer and adapted to provide DC signals on its output lines, said output lines of said rectifier being connected to said detector circuit, said electronic switch, and said counter to provide the power for operation thereof, said counter system further including an alternate input for reception of a direct current power source, said direct current power source being connected directly to said output lines of said rectifier so that said counting system may be operated by either alternating or direct current.

2. The invention of claim 1 and further including external logic, said logic being responsive to said detector circuit of said counting system for determining the direction of travel of an automobile, said logic further including means for inhibiting said means responsive to said signals from said detector circuit when said automobile is not travelling in a predetermined direction so that said counter is stepped only when said automobile detected is travelling in said predetermined direction.

3. A modular counting system, said counting system comprising a plurality of counting modules, a plurality of inductive coils each being located adjacent a lane for an automobile, each of said inductive coils being changed in inductance each time an automobile passes over said coil, at least one insulated box, said insulated box being permanently secured in a position adjacent the areas of said lanes adapted to house a plurality of counting modules, said box further including a pluggable connector to enable pluggable securement of said counting modules in said box, each of said pluggable connectors being connected to a power source and one of said inductive coils, each of said counting modules comprising a detector circuit for generating a signal in response to the change of inductance in the inductive coil to which the module is connected by said pluggable connector, said detector circuit adapted to generate said signal each time said condition is detected, a counter means responsive to said signals from said detector circuit for stepping said counter each time said signal is generated and display means associated with said counter for exhibiting the count of said counter, said display means being located on the outer surface of said counting module so that each of the plurality of modules can be read together when said insulated box is open, each of said modules being removable by unplugging said module from a pluggable connector so that upon determination that an individual module is defective, said module may be replaced by unplugging the defective module and plugging in a working module, each of said counting modules including an individual power switch, said power switch being connected between a power source external of said module and said detector and counter, said switch adapted to cut off the power of the individual module without affecting any external circuitry or any of the other modules.