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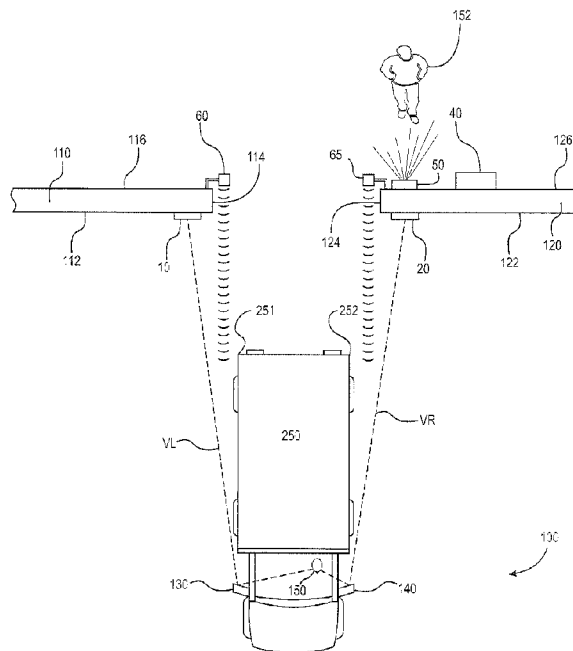
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(54) Titre : MECANISME D'AVERTISSEMENT ET D'ORIENTATION SERVANT A AIDER AU STATIONNEMENT DE
GRANDS VEHICULES

(54) Title: WARNING AND GUIDANCE SYSTEM TO ASSIST THE PARKING OF LARGE VEHICLES



(57) **Abrégé/Abstract:**

A guidance system for aligning a vehicle entering or leaving a garage, the garage having a front wall having an inner surface and an outer surface with an opening therein, the guidance system comprising a left photoelectric diffuse sensor operatively arranged to detect lateral movement of the vehicle, providing a left input signal, a right photoelectric diffuse sensor operatively arranged to detect movement of the vehicle, providing a right input signal, a left visual indicator operatively arranged to display an alert when the vehicle deviates from leftwardly alignment, a right visual indicator operatively arranged to display an alert when the vehicle deviates from rightwardly alignment and, a control center operatively arranged to receive the left and right input signals, calculate the leftwardly and rightwardly alignment, and cause the left and right visual indicators to display alerts when the vehicle deviates from leftwardly and/or rightwardly alignment by predetermined amounts.

1 ABSTRACT

2 A guidance system for aligning a vehicle entering or leaving a garage, the garage having
3 a front wall having an inner surface and an outer surface with an opening therein, the guidance
4 system comprising a left photoelectric diffuse sensor operatively arranged to detect lateral
5 movement of the vehicle, providing a left input signal, a right photoelectric diffuse sensor
6 operatively arranged to detect movement of the vehicle, providing a right input signal, a left
7 visual indicator operatively arranged to display an alert when the vehicle deviates from
8 leftwardly alignment, a right visual indicator operatively arranged to display an alert when the
9 vehicle deviates from rightwardly alignment and, a control center operatively arranged to receive
10 the left and right input signals, calculate the leftwardly and rightwardly alignment, and cause the
11 left and right visual indicators to display alerts when the vehicle deviates from leftwardly and/or
12 rightwardly alignment by predetermined amounts.

Warning and Guidance System to Assist the Parking of Large Vehicles

FIELD OF THE INVENTION

[0001] The invention relates generally to a warning and guidance system, and more specifically to a warning and guidance system to assist in the parking of large vehicles.

BACKGROUND OF THE INVENTION

[0002] Warning and guidance systems are used by individuals who require assistance parking large vehicles to prevent damage from occurring to the vehicle or building, and to increase the safety of personnel around the area by using visual and audio aids. Since an operator may not be able to see every angle of their vehicle, safety of personnel can become compromised. To increase safety and operating performance of guiding large vehicles, devices that output information to the operator can be positioned in certain configurations to provide the operator greater spatial awareness.

[0003] One way to provide such spatial awareness is disclosed in United States Patent No. 5,177,479 (Cotton) which discloses a garage parking position indicator. The garage parking position indicator comprises a wave energy detector such as an infrared receiver mounted to one side of the garage access door at a point greater than the length of the vehicle. A wave energy source, such as an infrared transmitter, is mounted on the opposite side of the garage access door from the receiver. The transmitter constantly transmits and directs wave energy toward the receiving means so that the presence of any portion of the vehicle between the transmitter and the receiver will interrupt reception of the wave energy by the receiver. Cotton fails to disclose or teach a system that can detect lateral movement of the vehicle as it approaches the garage access door. Instead, Cotton teaches a system that can detect whether a vehicle is parked fully within the garage only after the vehicle had entered the garage.

[0004] Another example of providing such spatial awareness is disclosed in United States Patent No. 3,493,925 (Brancale) which discloses a position indicating system where a magnetic proximity switch is mounted to one side of a garage with another magnetic proximity sensor mounted on the opposite side of the garage. The switch operates in response to the positioning of a vehicle at a minimum distance from the sensor. Brancale fails to disclose or teach a system that can detect a vehicle outside of the garage and also fails to disclose a method of detecting non-metallic parts, which are included within many modern day vehicles.

1 **[0005]** Yet another example of providing such spatial awareness is disclosed in United
2 States Patent Application No. 2011/0316720 (Ghatak) which discloses a parking guidance
3 system having a pair of photoelectric sensors, a pair of reflectors, and an indicator box having
4 both left and right indicator arrows. The photoelectric sensors and reflectors are configured
5 inside the garage to create a left light beam near the left interior wall of the garage and a right
6 light beam near the right interior wall of the garage. The indicator box is positioned on the rear
7 inside wall of the garage. The guidance system is activated by lifting the garage door and is
8 deactivated by closing the garage door. Ghatak fails to disclose or teach a system that detects a
9 vehicle outside of the garage or a system which can be activated the system remotely.

10 **[0006]** Yet another example of providing such spatial awareness is disclosed in United
11 States Patent No. 8,427,340 (Palmieri) which discloses a vehicle maneuver communication
12 system includes a spotter which interacts with an exo-vehicle component and manipulates
13 visual cues that are provided to the driver. Palmieri fails to disclose or teach a system that has
14 photoelectric eyes which provide the input to the system.

15 **[0007]** Thus, a long felt need exists for a warning and guidance system which assists in
16 the parking of large vehicles that can detect the presence of a vehicle prior to entering the
17 parking area. Additionally, there is a long-felt need for a warning system that is operated solely
18 by the driver.

19 BREIF SUMMARY OF THE INVENTION

20 **[0008]** The present invention broadly includes a guidance system for aligning a vehicle
21 entering or leaving a garage, the garage having a front wall, the front wall having an opening
22 therein, the opening bounded by a left front wall section and a right front wall section, the front
23 wall having an inner surface and an outer surface, the guidance system comprising a left
24 photoelectric diffuse sensor mounted on the left front wall section and operatively arranged to
25 detect lateral movement of the vehicle, the left sensor providing a left input signal, a right
26 photoelectric diffuse sensor mounted on the right front wall section and operatively arranged to
27 detect movement of the vehicle, the right sensor providing a right input signal, a left visual
28 indicator mounted on the outer surface on the left front wall section, the left visual indicator
29 operatively arranged to display an alert when the vehicle deviates from leftwardly alignment with
30 respect to the opening by a predetermined amount, a right visual indicator mounted on the outer
31 surface on the right front wall section, the right visual indicator operatively arranged to display
32 an alert when the vehicle deviates from rightwardly alignment with respect to the opening by a

predetermined amount and, a control center operatively arranged to receive the left and right input signals, to calculate the leftwardly and rightwardly alignment, and to cause the left and right visual indicators to display the alerts when the vehicle deviates from the leftwardly and/or rightwardly alignment by the predetermined amounts.

[0009] The invention also comprises a transmitter operatively arranged on the vehicle to output a signal to the control center wherein the signal determines proximity of the vehicle to the garage.

[0010] The invention also comprises an indoor visual indicator mounted on the indoor surface of the front wall, the indoor visual indicator operatively arranged to display an alert when the vehicle deviates from leftwardly or rightwardly alignment with respect to the opening by a predetermined amount.

[0011] A general object of the invention is to provide a guidance system for large vehicles leaving and entering a garage to prevent the vehicle from colliding with the garage.

[0012] A further object of the invention is to provide a warning system for nearby pedestrians of large vehicles leaving or entering a garage.

[0013] These and other objects, features and advantages of the present invention will become readily apparent upon a reading and review of the following detailed description of the invention, in view of the appended drawings and claims.

BRIEF DESCRIPTION OF THE DRAWINGS

[0014] The nature and mode of operation of the present invention will now be more fully described in the following detailed description of the invention taken with the accompanying figures, in which:

Figure 1 is a top view of a vehicle backing into a garage using an embodiment of the present invention;

Figure 2 is an outdoor view of a vehicle backing into a garage using an embodiment of the present invention;

Figure 3 is an indoor view of a vehicle backing into a garage using an embodiment of the present invention;

Figure 4A is a front view of the light bars in caution mode;

1 Figure 4B is a front view of the light bars in safety mode;
2 Figure 5 is a perspective view of the interior light bar and control box;
3 Figure 6 is a view from the inside of the vehicle from the perspective of a driver;
4 Figure 7 is an indoor view showing the truncated light bar and control box with
5 the garage door closed;
6 Figure 8 is a flow chart delineating when the caution modes are displayed on
7 which light bars;
8 Figure 9 is a flow chart delineating the priority interrupt service;
9 Figure 10 is a fragmented schematic view of the internal electronics;
10 Figure 11 is a fragmented schematic view of the internal electronics;
11 Figure 12 is a fragmented schematic view of the internal electronics;
12 Figure 13 is a fragmented schematic view of the internal electronics;
13 Figure 14 is a fragmented schematic view of the internal electronics;
14 Figure 15 is a fragmented schematic view of the internal electronics;
15 Figure 16 is a fragmented schematic view of the internal electronics;
16 Figure 17 is a fragmented schematic view of the internal electronics;
17 Figure 18 is a fragmented schematic view of the internal electronics;
18 Figure 19 is a fragmented schematic view of the internal electronics; and,
19 Figure 20 is a fragmented schematic view of the internal electronics.

20 DETAILED DESCRIPTION OF THE INVENTION

21 **[0015]** At the outset, it should be appreciated that like drawing numbers on different
22 drawing views identify identical, or functionally similar, structural elements of the invention. It is
23 to be understood that the invention as claimed is not limited to the disclosed aspects.

24 **[0016]** Furthermore, it is understood that this invention is not limited to the particular
25 methodology, materials and modifications described and as such may, of course, vary. It is also
26 understood that the terminology used herein is for the purpose of describing particular aspects
27 only, and is not intended to limit the scope of the present invention as claimed.

[0017] Unless defined otherwise, all technical and scientific terms used herein have the same meaning as commonly understood to one of ordinary skill in the art to which this invention pertains. It should be understood that any methods, devices or materials similar or equivalent to those described herein can be used in the practice or testing of the invention.

[0018] Figure 1 is a top view of truck **250** backing up between wall **110** and **120** using guidance system **100**. Guidance system **100** comprises light bar **10**, light bar **20**, sensor **60**, sensor **65**, light **50**, interior light bar **30**, control box **40**, and transmitter **258** (shown in Figure 6). Wall **110** comprises exterior surface **112**, interior surface **116**, and side surface **114**. In addition, wall **120** comprises exterior surface **122**, interior surface **126**, and side surface **124**. Light bar **10** is arranged on exterior surface **112** and light bar **20** is arranged on exterior surface **122**. Light bars **10** and **20** are operatively arranged to help warn driver **150** of lateral movement as truck **250** reverses between side walls **110** and **120**. The reflection of light bar **10** can be seen by driver **150** in side mirror **130** of truck **250** along line **VL** and the reflection of light bar **20** can be seen by driver **150** in side mirror **140** of truck **250** along line **VR**. This arrangement allows driver **150** to center truck **250** between walls **110** and **120**. In an example embodiment, guidance system **100** further comprises another light bar and sensor (not shown) arranged in an area behind the reversing vehicle in order to determine when a vehicle has reversed sufficiently to be completely within the garage. This sensor and light bar would be of the same construction as sensor **60** and interior light bar **30**.

[0019] In order for light bars **10** and **20** to communicate a signal to the driver, surfaces **251** and **252** of truck **250** are detected. As truck **250** reverses towards walls **110** and **120**, sensor **60** detects surface **251** and measures the distance between surface **251** and side surface **114**. Correspondingly, as truck **250** reverses towards walls **110** and **120**, sensor **65** detects surface **252** of truck **250** and measures the distance between surface **252** and side surface **124**. If either sensor **60** or sensor **65** detects a distance that is less than a predetermined length, the sensor sends a signal to control box **40** and then to the corresponding light bar, light bar **10** for sensor **60** and light bar **20** for sensor **65**. This signal causes a change in light bars **10** and **20**, which is discussed below. This change can be seen by driver **150** along lines **VL** and **VR**, indicating that there may be a problem and that driver **150** should halt truck **250**. In an example embodiment, sensors **60** and **65** are diffuse photoelectric sensors. Diffuse photoelectric sensors use a target, such as truck **250**, as the reflector so that detection occurs due to a reflection of light off truck **250** and back to sensors **60** or **65** as opposed to an interruption of a beam. Sensors **60** and **65** each send out a beam of light, most

1 often it is a pulsed infrared, visible red, or laser beam, which reflects off truck **250** and diffuses
2 back towards sensors **60** and **65**. Part of the reflected beam returns back to a receiver inside
3 sensors **60** and **65**. Detection occurs when enough light is reflected back to the receiver. It
4 should be appreciated, however, that other sensors and configurations are possible and
5 considered to be within the scope of the invention as claimed. For example, sensors **60** and **65**
6 could be ultrasonic sensors to determine the distance between truck **250** and walls **110** and
7 **120**.

8 **[0020]** Interior light bar **30** and control box **40** are arranged on interior surface **126** of
9 wall **120**. Interior light bar **30** signals to pedestrian **152** and others around the area that truck
10 **250** is moving between wall **110** and wall **120**. Control box **40** is operatively arranged to
11 communicate with both light bars **10** and **20**, interior light bar **30**, truck **250**, and light **50**. When
12 truck **250** is close enough for control box **40** to receive a signal from transmitter **258** from within
13 truck **250**, guidance system **100** activates turning on light bars **10** and **20**, light **50**, and interior
14 light bar **30**. Also, an audible warning signal is activated when guidance system **100** senses a
15 truck within proximity on control box **40**. This audible signal originates from speaker **290** (shown
16 in Figure 20) arranged on interior surface **126** and communicates with control box **40** to
17 determine when the signal should be activated or deactivated.

18 **[0021]** Figure 2 is an outdoor view of truck **250** reversing between wall **110** and wall
19 **120**. As seen in the figure, sensors **60** and **65** are arranged on interior surface **126** in order to
20 prevent damage from occurring. Light bar **10** is connected to control box **40** (shown in Figure 1)
21 via wire **11** which is fed through aperture **119** positioned on exterior surface **112**.
22 Correspondingly, light bar **20** is connected to control box **40** (shown in Figure 1) via wire **21**
23 which is fed through aperture **129** positioned on exterior surface **122**. Light **50** is positioned on
24 interior surface **126** and is illuminated when transmitter **258** (shown in Figure 6) sends a signal
25 to control box **40**.

26 **[0022]** Guidance system **100** comprises several safety features as shown in Figure 3.
27 Switch **80** is operatively arranged to be triggered when surface **162** of door **160** fully engages
28 switch **80** to indicate to guidance system **100** that door **160** is fully raised. Interior light bar **30** is
29 connected to control box **40** via wire **31**. If a problem were to occur, pedestrian **152** could use
30 remote **45** which is located on interior surface **126**. By using remote **45**, driver **150** is alerted to
31 stop reversing truck **250** by changing the signal on light bars **10** and **20** (shown in Figure 2) and
32 interior light bar **30**.

[0023] Guidance system **100** has both a safety mode and a caution mode. The signal output of light bars **10** and **20** correspond to the safety and caution modes. Figure 4a is a front view of light bar **10** and light bar **20** in caution mode. Light bar **10** comprises front surface **13** which has a plurality of apertures filled by corresponding light banks **17a**, **17b**, **12a**, **12b**, **12c**, and **12d** (shown in Figure 4b). When in caution mode, light bar **10** illuminates light bank **17a** and **17b** and blinks. Correspondingly, light bar **20** illuminates light bank **27a** and **27b** and blinks when in caution mode. Light bar **20** comprises a front surface **23** which has a plurality of apertures filled by corresponding light banks **27a**, **27b**, **22a**, **22b**, **22c**, and **22d** (shown in Figure 4b). Caution mode occurs due to factors including door **160** not being fully raised, truck **250** being too close to either wall **110** or wall **120**, or from remote **45** being pressed. In an example embodiment, light banks **17a**, **17b**, **27a**, and **27b** each contain three rows of five red LEDs. It should be appreciated, however, that other light sources, colors, and configurations are possible and considered to be within the scope of the invention as claimed. For example, light banks **17a**, **17b**, **27a**, and **27b** could comprise halogen lights which have a colored lens and arranged in a single row.

[0024] After guidance system **100** is activated and all necessary requirements have been met, guidance system **100** changes from caution mode to safety mode. Figure 4b is a front view of light bar **10** and light bar **20** while in safety mode. When in safety mode, light banks **12a**, **12b**, **12c**, and **12d** of light bar **10** illuminate and exhibit a cascading effect towards edge **18**. Also, light banks **22a**, **22b**, **22c**, and **22d** of light bar **20** illuminate and exhibit a cascading effect towards edge **28**. In an example embodiment, light banks **12a**, **12b**, **12c**, **12d**, **22a**, **22b**, **22a**, and **22b** each contain three rows of five red LEDs. It should be appreciated, however, that other light sources, colors, and configurations are possible and considered to be within the scope of the invention as claimed. For example, light banks **12a**, **12b**, **12c**, **12d**, **22a**, **22b**, **22a**, and **22b** could comprise halogen lights which have a colored lens and arranged in a single row.

[0025] Figure 5 is a perspective view of interior light bar **30** and control box **40**. Interior control box **30** comprises a front surface **35** which contains a plurality of apertures filled by light bank **32** and light bank **37**. Light bank **32** is activated when guidance system **100** is in safety mode and light bank **37** activates when guidance system **100** is in caution mode. Both light bank **32** and **37** have corresponding output signals with light bar **10** and light bar **20** (shown in Figure 4a and 4b). Control box **40** connects with interior light bar **30** via cable **31** in order for control box **40** to output a signal to interior light bar **30**.

1 **[0026]** As driver **150** reverses truck **250**, driver **150** sees reflection **10'** and reflection **20'**
2 as seen in Figure 6. Using mirrors **130** and **140**, driver **150** has a clear view of what mode
3 guidance system **100** is in. In the figure, guidance system **100** is in safety mode so driver **150** is
4 clear to reverse truck **150** (shown in Figure 1). Transmitter **258** is arranged on surface **259** and
5 directly related to the ignition of truck **250**. In other words, if truck **250** is in operation, transmitter
6 **258** is outputting a signal to control box **40** (shown in Figure 2). In an example embodiment,
7 transmitter **258** is located on surface **259**. It should be appreciated, however, that other
8 locations for transmitter **258** are possible and considered to be within the scope of the invention
9 as claimed. For example, transmitter **258** can be located on an outside surface of truck **250** in
10 order for transmitter **258** to output a stronger signal to control box **40**.

11 **[0027]** When truck **250** is not within proximity of control box **40** or the ignition of truck
12 **250** is turned off, guidance system **100** is in a standby mode. In standby mode, interior light bar
13 **30** is off, that is neither light bank **32** nor light bank **37** is illuminated. Correspondingly, light bar
14 **10** and light bar **20** are also in a standby mode (not shown). When guidance system **100** is in
15 standby mode, there is no present danger from truck **250** (not shown), therefore, pedestrian **152**
16 can traverse around the area without fear of injury from truck **250**. If truck **250** were to return to
17 within proximity of control box **40**, then guidance system **100** would activate and go into caution
18 mode until door **160** is fully raised and triggers sensor **80**. This would alert pedestrian **152** that a
19 truck is approaching and that the area behind wall **110** and wall **120** should be cleared.

20 **[0028]** The apparatus of the present invention including the circuit board which is
21 illustrated in Figure 10 through Figure 20 is commercially available from Aire-Deb Corporation,
22 1625 Lindan Avenue, Alden, NY 14004. The apparatus is also commercially available from
23 Digital Instruments Incorporated, 580 Ensminger Road, Tonawanda, NY 14150.

24 **[0029]** Micro controller units **292**, **302**, and **312** are MC9S08SH8 series micro controller
25 units that support up to 17 general-purpose I/O pins and 1 output-only pin which are shared with
26 on-chip peripheral functions such as timers, serial I/O, and ADC. When a port pin is configured
27 as a general-purpose output or a peripheral uses the port pin as an output, software can select
28 one of two drive strengths and enable or disable slew rate control. When a port pin is configured
29 as a general-purpose input or a peripheral uses the port pin as an input, software can enable a
30 pull-up device. Immediately after reset, all of these pins are configured as high-impedance
31 general-purpose inputs with internal pull-up devices disabled. MC9S08SH8 series micro
32 controller unit are available for purchase from freescale at
33 http://www.freescale.com/webapp/sps/site/prod_sum

1 mary.jsp?code=S0SH.

2 **[0030]** Buffers **294**, **304**, and **314** are 74HC541 3-STATE non-inverting buffers that
3 possess high drive current outputs which enable high speed operation even when driving large
4 bus capacitances. 74HC541 buffers are available for purchase from Futurlec at
5 <http://www.futurlec.com/IC74HC00Series.shtml>.

6 **[0031]** Optocouplers **296** and **306** are H11L2 microprocessor compatible optocouplers
7 that have a medium-to-high speed integrated circuit detector optically coupled to an infrared
8 emitting diode. The output incorporates a Schmitt trigger, which provides hysteresis for noise
9 immunity and pulse shaping. The detector circuit is optimized for simplicity of operation and
10 utilizes an open collector output for maximum application flexibility. H11L2 microprocessor
11 compatible optocouplers are available for purchase from Newark at [http://www.newark.com/isoc](http://www.newark.com/isocom/h11l2/optocoupler-dip-6-schmitt-trig/dp/40P0272)
12 [om/h11l2/optocoupler-dip-6-schmitt-trig/dp/40P0272](http://www.newark.com/isocom/h11l2/optocoupler-dip-6-schmitt-trig/dp/40P0272).

13 **[0032]** Converters **298** and **310** are NFM20 isolated power converters that protect
14 equipment at the power source and provide a physical separation between the electrical
15 grounds of nearby circuits, preventing ground loops. NFM20 isolated power converters remove
16 or reduce electrical issues that would otherwise be transmitted to the receiving circuit. NFM20
17 isolated power converters are commonly implemented with transformers, full-bridge rectifiers,
18 power factor correction, and DC-DC converters, but may also use optocouplers and optical fiber
19 to shift voltage levels, remove operators from dangerous supply voltages, and provide galvanic
20 isolation. NFM20 isolated power converters are available for purchase from Mouser Electronics
21 at [http://www.mouser.com/ProductDetail/Mean-Well/NFM-](http://www.mouser.com/ProductDetail/Mean-Well/NFM-205/?qs=pqZ7J9Gt/mozasVN2q2rkA==)
22 [205/?qs=pqZ7J9Gt/mozasVN2q2rkA==](http://www.mouser.com/ProductDetail/Mean-Well/NFM-205/?qs=pqZ7J9Gt/mozasVN2q2rkA==).

23 **[0033]** Regulators **300**, **308**, and **316** are 7805 regulators with three terminal regulators
24 with several fixed output voltages making them useful in a wide range of applications. One of
25 these is local on card regulation, eliminating the distribution problems associated with single
26 point regulation. The voltages available allow these regulators to be used in logic systems,
27 instrumentation, HiFi, and other solid state electronic equipment. Although designed primarily as
28 fixed voltage regulators, these devices can be used with external components to obtain
29 adjustable voltages and currents. 7805 regulators are available for purchase from Texas
30 Instruments at <http://www.ti.com/product/lm7805c>.

31 **[0034]** Transistors **295** and **305** are MMBT2222ALT1 general purpose transistors that
32 are used for low-power amplifying or switching applications. It is designed for low to medium
33 current, low power, medium voltage, and can operate at moderately high speeds.

1 MMBT2222ALT1 general purpose transistors are available for purchase from Futurlec at
2 <http://www.futurlec.com/TransGen2N.shtml>.

3 **[0035]** Photocouplers **302, 322, 324, 326, 330, 330, 332, 334, 336, 340, 342, 344,** and
4 **346** are PS2501-2 high isolation voltage photocouplers containing a GaAs light emitting diode
5 and an NPN silicon phototransistor. PS2501-2 high isolation voltage photocouplers are available
6 for purchase from Futurlec at <http://www.futurlec.com/LEDOpto.shtml>.

7 **[0036]** It will be appreciated that various of the above-disclosed and other features and
8 functions, or alternatives thereof, may be desirably combined into many other different systems
9 or applications. Various presently unforeseen or unanticipated alternatives, modifications,
10 variations, or improvements therein may be subsequently made by those skilled in the art which
11 are also intended to be encompassed by the following claims.

12

1	<u>List of reference numbers</u>	
2	10	light bar
3	10'	reflection
4	11	wire
5	12a	light bank
6	12b	light bank
7	12c	light bank
8	12d	light bank
9	13	surface
10	17a	light bank
11	17b	light bank
12	18	edge
13	20	light bar
14	20'	reflection
15	21	wire
16	22a	light bank
17	22b	light bank
18	22c	light bank
19	22d	light bank
20	23	surface
21	27a	light bank
22	27b	light bank
23	28	edge
24	30	interior light bar
25	31	wire
26	32	light bank
27	33	edge
28	35	front surface
29	37	light bank
30	40	control box
31	45	remote
32	50	light
33	60	sensor

1	65	sensor
2	80	switch
3	100	guidance system
4	110	wall
5	112	exterior surface
6	114	side surface
7	116	interior surface
8	119	aperture
9	120	wall
10	122	exterior surface
11	124	side surface
12	126	interior surface
13	129	aperture
14	130	mirror
15	140	mirror
16	150	driver
17	152	pedestrian
18	160	door
19	162	surface
20	250	truck
21	251	surface
22	252	surface
23	258	transmitter
24	259	surface
25	280	plurality of LEDs
26	281	plurality of LEDs
27	282	plurality of LEDs
28	286	plurality of LEDs
29	287	plurality of LEDs
30	290	speaker
31	292	MC9S08SH8 micro controller unit
32	294	74HC541 buffer
33	295	MMBT2222ALT1 transistor

1	296	H11L2 optocoupler
2	298	NFM20 converter
3	300	7805 regulator
4	302	MC9S08SH8 micro controller unit
5	304	74HC51 buffer
6	305	MMBT2222ALT1 transistor
7	306	H11L2 optocoupler
8	308	7805 regulator
9	310	NFM20 converter
10	312	MC9S08SH8 micro controller unit
11	314	74HC541 buffer
12	316	7805 regulator
13	320	PS2501-4 photocoupler
14	322	PS2501-4 photocoupler
15	324	PS2501-4 photocoupler
16	326	PS2501-4 photocoupler
17	330	PS2501-4 photocoupler
18	332	PS2501-4 photocoupler
19	334	PS2501-4 photocoupler
20	336	PS2501-4 photocoupler
21	340	PS2501-4 photocoupler
22	342	PS2501-4 photocoupler
23	344	PS2501-4 photocoupler
24	346	PS2501-4 photocoupler
25	350	relay
26	352	relay
27	VL	line
28	VR	line
29		

WE CLAIM:

1. A guidance system for aligning a vehicle entering or leaving a garage, said garage having a front wall, the front wall having an opening therein, said opening bounded by a left front wall section and a right front wall section, said front wall having an inner surface and an outer surface, said guidance system comprising:

a left photoelectric diffuse sensor mounted on said left front wall section and operatively arranged to detect lateral movement of said vehicle, said left sensor providing a left input signal;

a right photoelectric diffuse sensor mounted on said right front wall section and operatively arranged to detect movement of said vehicle, said right sensor providing a right input signal;

a left visual indicator mounted on said outer surface on said left front wall section, said left visual indicator operatively arranged to display an alert when said vehicle deviates from leftwardly alignment with respect to said opening by a predetermined amount;

a right visual indicator mounted on said outer surface on said right front wall section, said right visual indicator operatively arranged to display an alert when said vehicle deviates from rightwardly alignment with respect to said opening by a predetermined amount; and,

a control center operatively arranged to receive said left and right input signals, to calculate said leftwardly and rightwardly alignment, and to cause said left and right visual indicators to display said alerts when said vehicle deviates from said leftwardly and/or rightwardly alignment by said predetermined amounts.

2. The guidance system recited in Claim 1, wherein said guidance system further comprises a switch arranged to determine if said opening is accessible.

3. The guidance system recited in Claim 1 or 2, wherein said guidance system further comprises a transmitter within said vehicle.

4. The guidance system recited in Claim 3, wherein said transmitter outputs a signal to said control center.

5. The guidance system recited in any one of Claims 1 to 4, wherein said left visual indicator and said right visual indicator comprises a first set of LED light banks and a second set of LED light banks.
6. The guidance system recited in Claim 5, wherein said first and second set of LED light banks comprises fifteen LEDs in a 3 x 5 pattern.
7. The guidance system recited in Claim 5, wherein said first set of LED light banks comprises red LEDs.
8. The guidance system recited in Claim 5, wherein said second set of LED light banks comprises amber LEDs.
9. The guidance system recited in any one of Claims 1 to 8, wherein said control center further comprises a button which when activated, said left visual indicator and said right visual indicator display an alert.
10. A guidance system for aligning a vehicle entering or leaving a garage, said garage having a front wall, the front wall having an opening therein, said opening bounded by a left front wall section and a right front wall section, said front wall having an inner surface and an outer surface, said guidance system comprising:
 - a left photoelectric diffuse sensor mounted on said left front wall section and operatively arranged to detect lateral movement of said vehicle, said left sensor providing a left input signal;
 - a right photoelectric diffuse sensor mounted on said right front wall section and operatively arranged to detect movement of said vehicle, said right sensor providing a right input signal;
 - a left visual indicator mounted on said outer surface on said left front wall section, said left visual indicator operatively arranged to display an alert when said vehicle deviates from leftwardly alignment with respect to said opening by a predetermined amount;
 - a right visual indicator mounted on said outer surface on said right front wall section, said right visual indicator operatively arranged to display an alert when said vehicle deviates from rightwardly alignment with respect to said opening by a predetermined amount;

a control center operatively arranged to receive said left and right input signals, to calculate said leftwardly and rightwardly alignment, and to cause said left and right visual indicators to display said alerts when said vehicle deviates from said leftwardly and/or rightwardly alignment by said predetermined amounts; and,

a transmitter operatively arranged on said vehicle to output a signal to said control center

wherein said signal determines proximity of said vehicle to said garage.

11. The guidance system recited in Claim 10, wherein said transmitter activates when the ignition of said vehicle is engaged.

12. The guidance system recited in Claim 11, wherein said guidance system activates when said transmitter is within proximity of said control center.

13. The guidance system recited in any one of Claims 10 to 12, wherein said guidance system further comprises an inner visual indicator mounted on said inner surface of said front wall.

14. A guidance system for aligning a vehicle entering or leaving a garage, said garage having a front wall, the front wall having an opening therein, said opening bounded by a left front wall section and a right front wall section, said front wall having an inner surface and an outer surface, said guidance system comprising:

a left photoelectric diffuse sensor mounted on said left front wall section and operatively arranged to detect lateral movement of said vehicle, said left sensor providing a left input signal;

a right photoelectric diffuse sensor mounted on said right front wall section and operatively arranged to detect movement of said vehicle, said right sensor providing a right input signal;

a left visual indicator mounted on said outer surface on said left front wall section, said left visual indicator operatively arranged to display an alert when said vehicle deviates from leftwardly alignment with respect to said opening by a predetermined amount;

a right visual indicator mounted on said outer surface on said right front wall section, said right visual indicator operatively arranged to display an alert when said vehicle deviates from rightwardly alignment with respect to said opening by a predetermined amount;

an inner visual indicator mounted on said inner surface of said front wall, said inner visual indicator operatively arranged to display an alert when said vehicle deviates from leftwardly or rightwardly alignment with respect to said opening by a predetermined amount; and,

a control center operatively arranged to receive said left and right input signals, to calculate said leftwardly and rightwardly alignment, and to cause said left, right, and inner visual indicators to display said alerts when said vehicle deviates from said leftwardly and/or rightwardly alignment by said predetermined amounts.

15. The guidance system recited in Claim 14, wherein said inner visual indicator displays an alert identical to said left visual indicator and said right visual indicator.

16. The guidance system recited in Claim 15, wherein said inner visual indicator receives a signal input from said control center.

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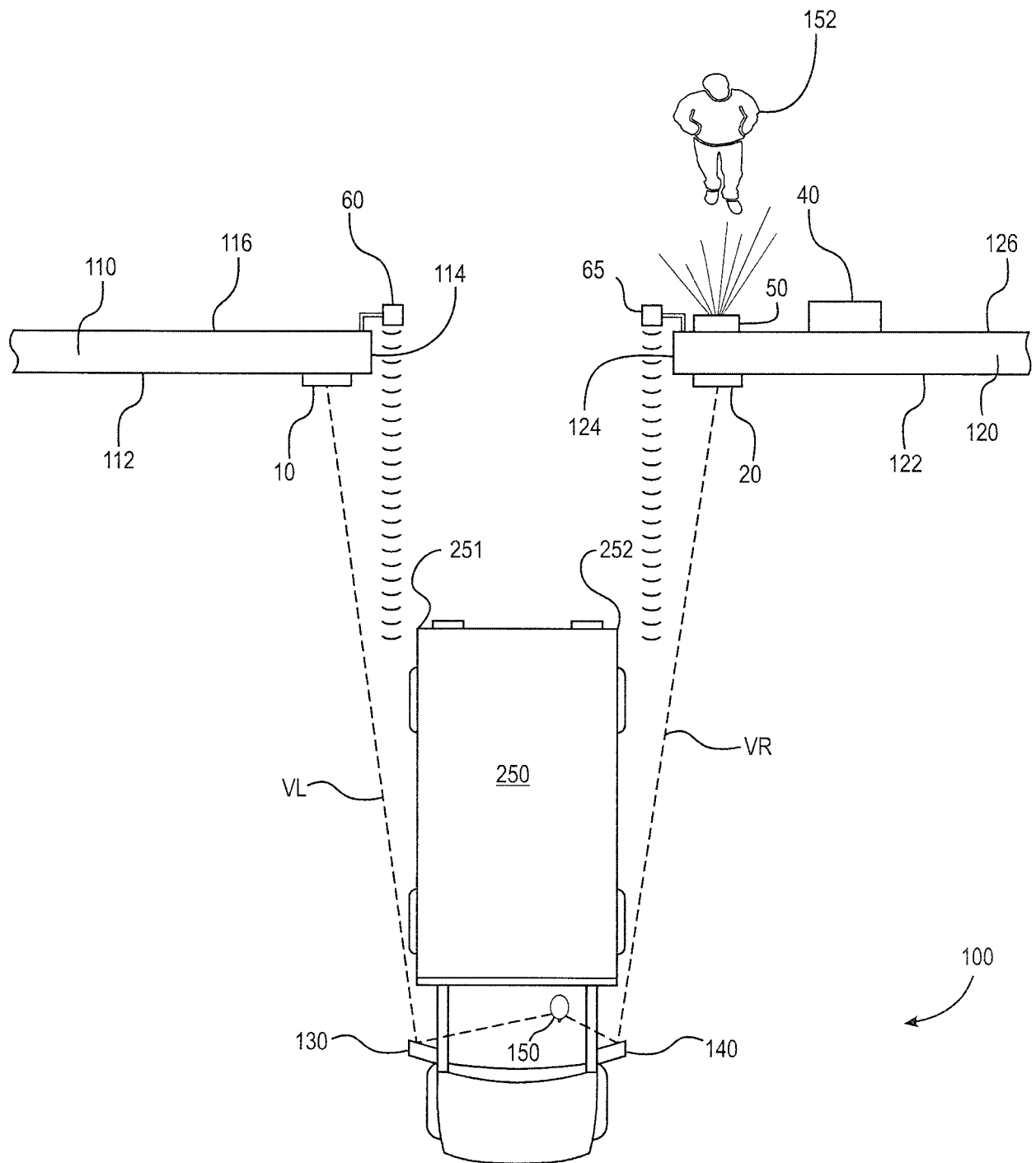


Fig. 1

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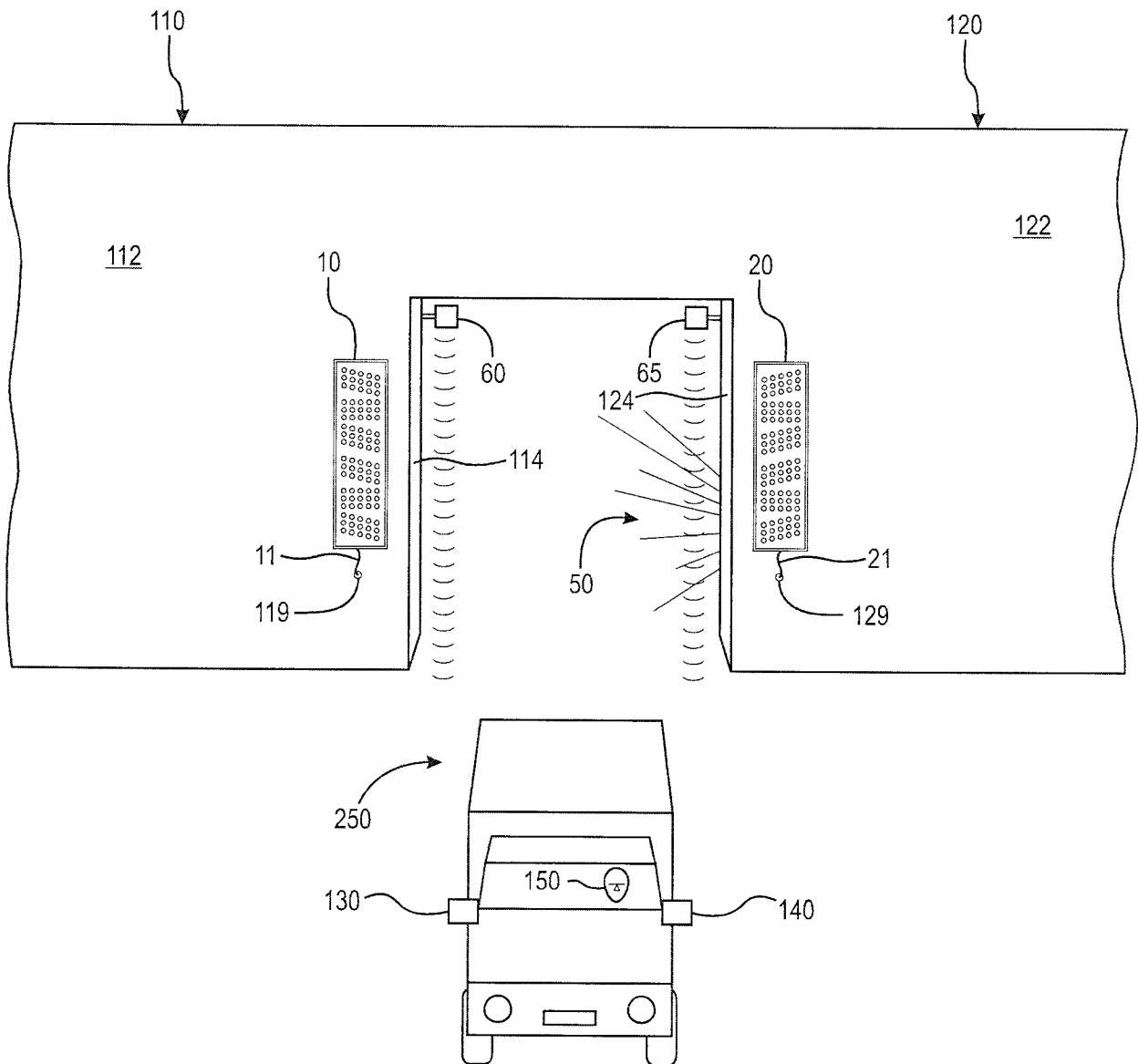


Fig. 2

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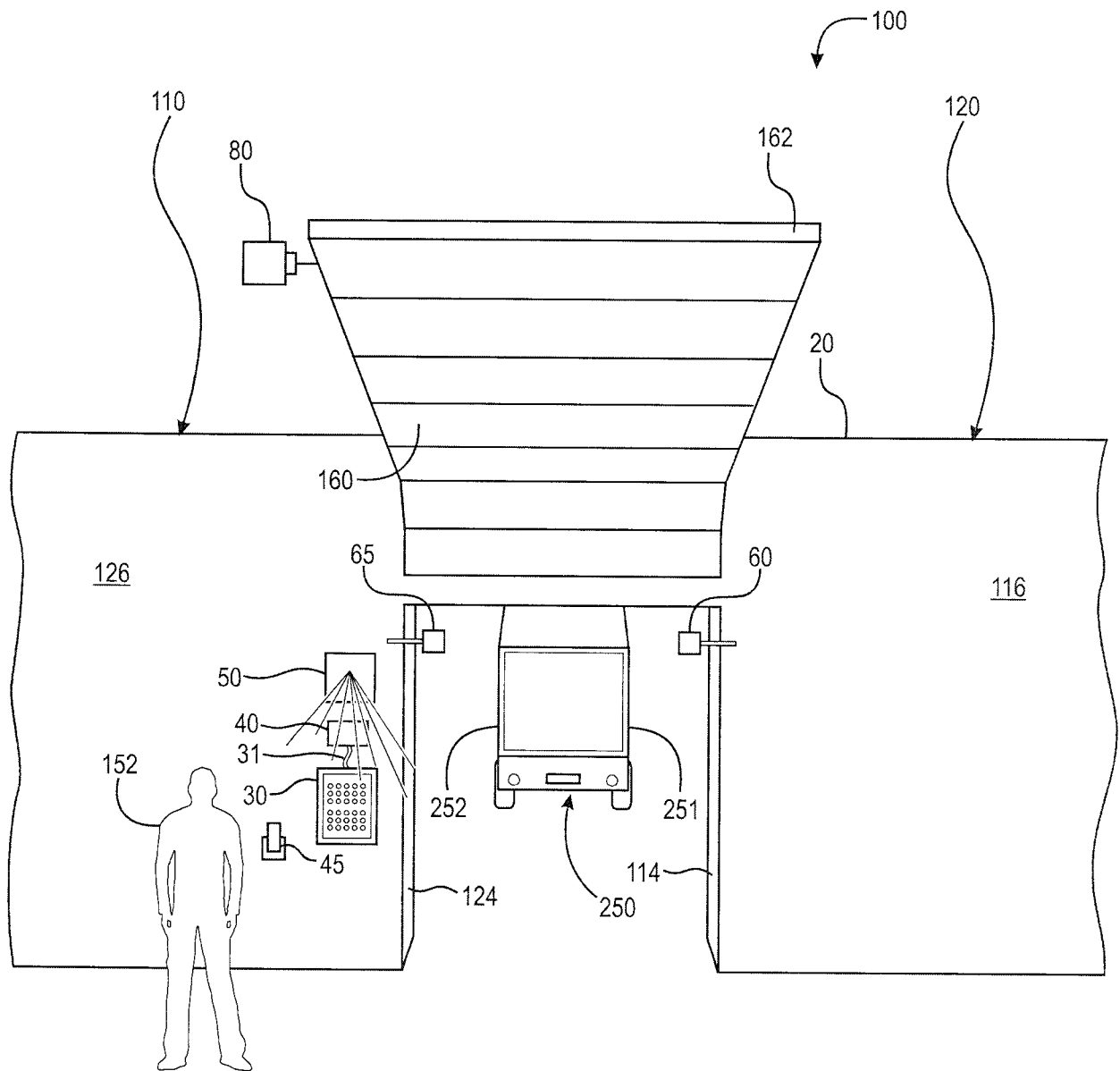


Fig. 3

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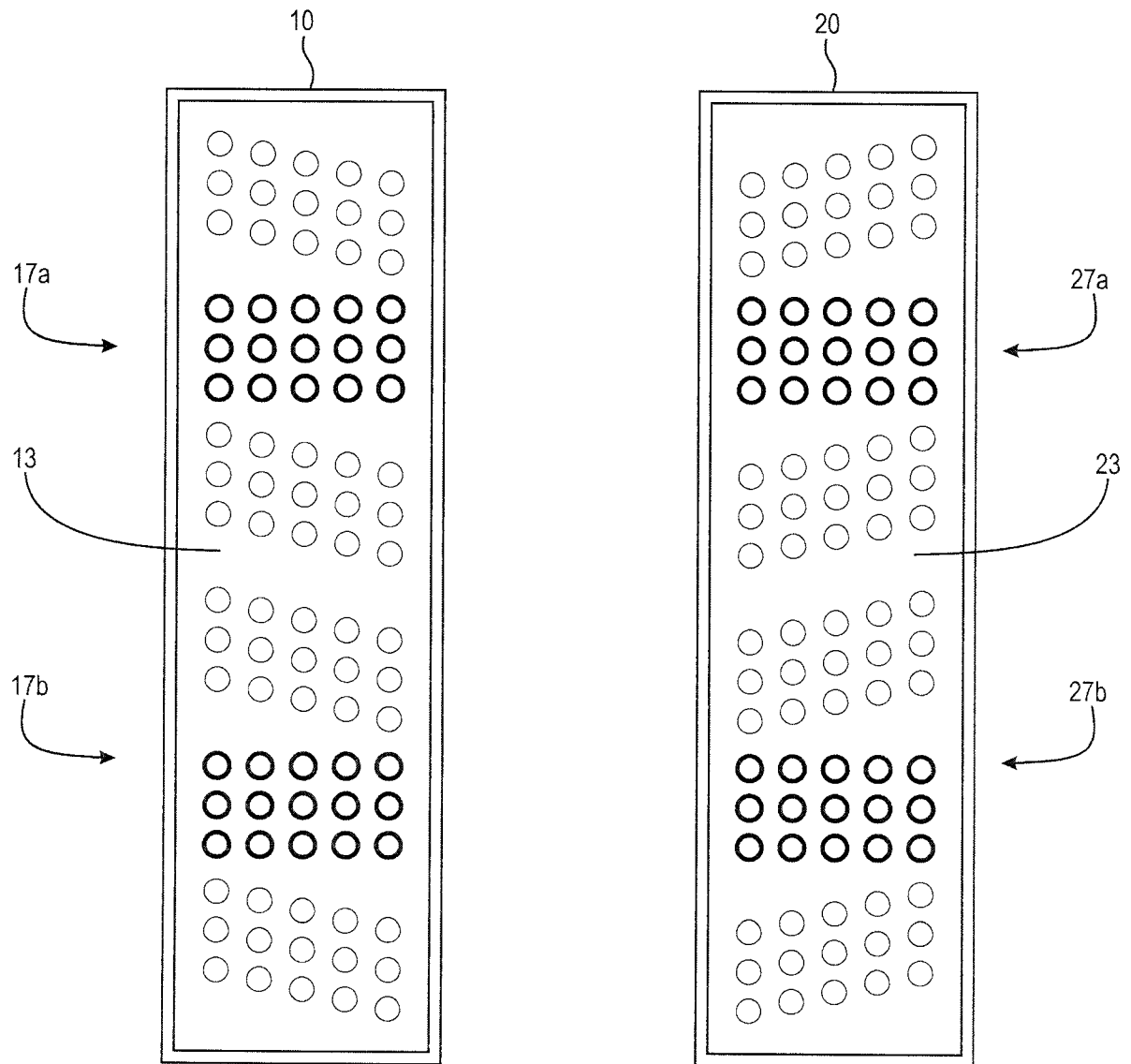


Fig. 4a

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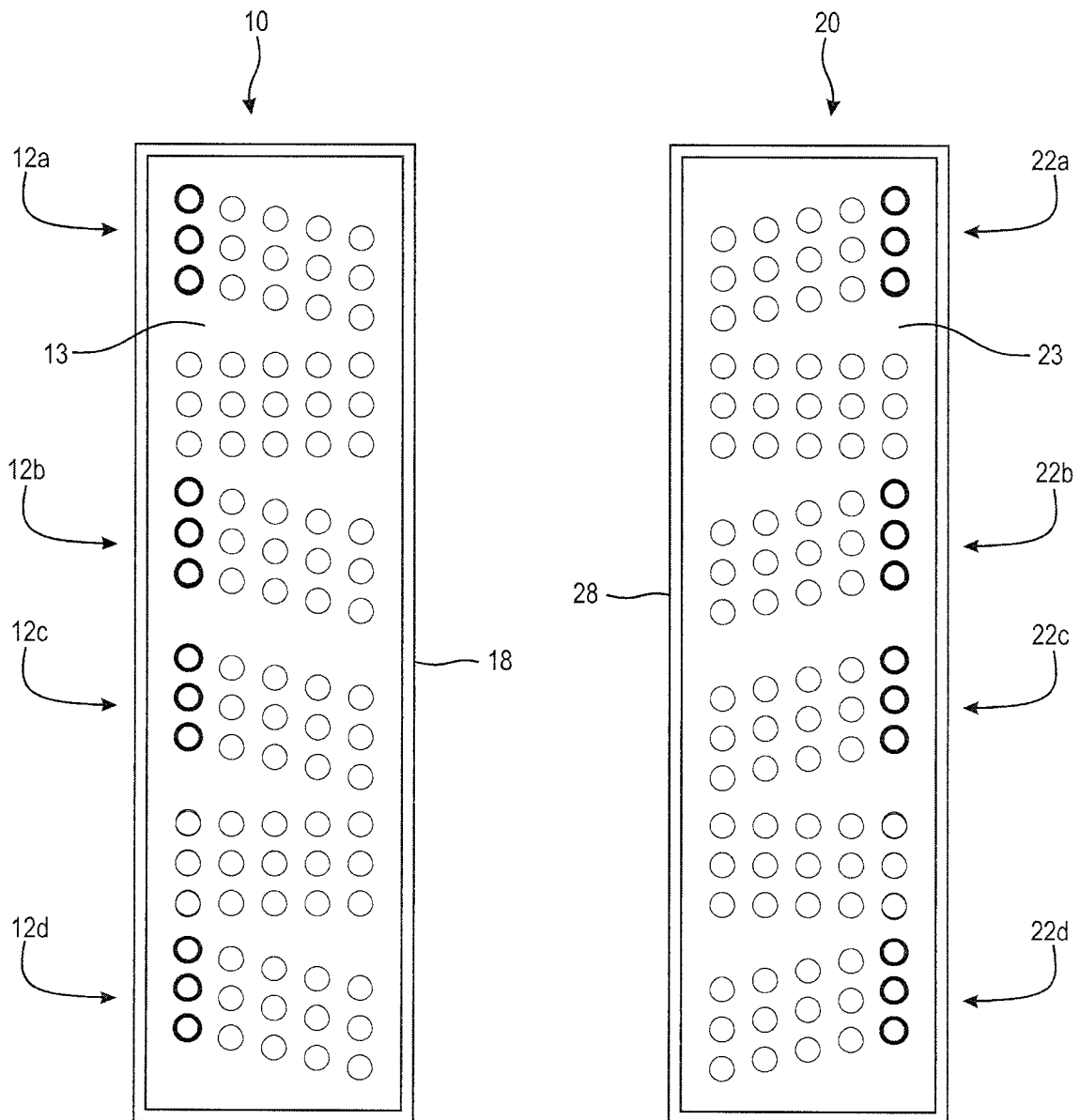


Fig. 4b

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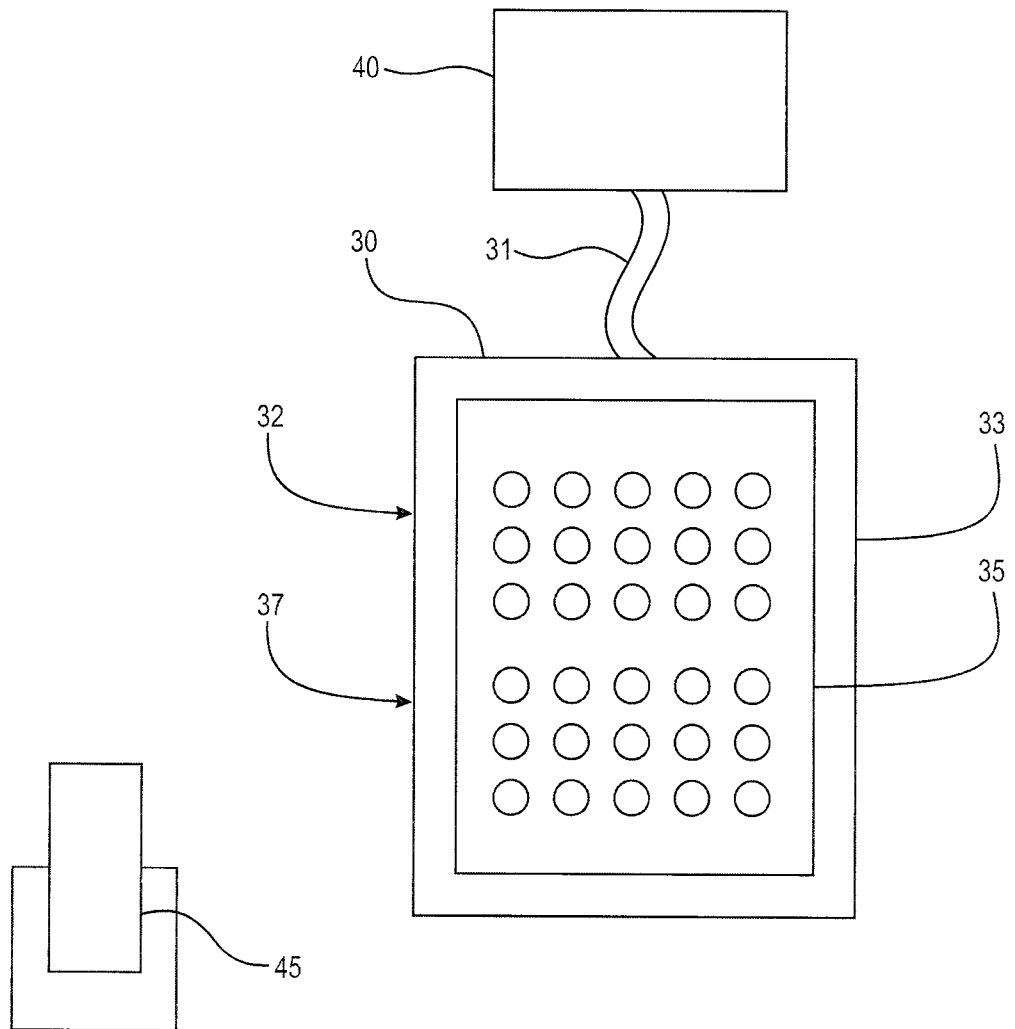


Fig. 5

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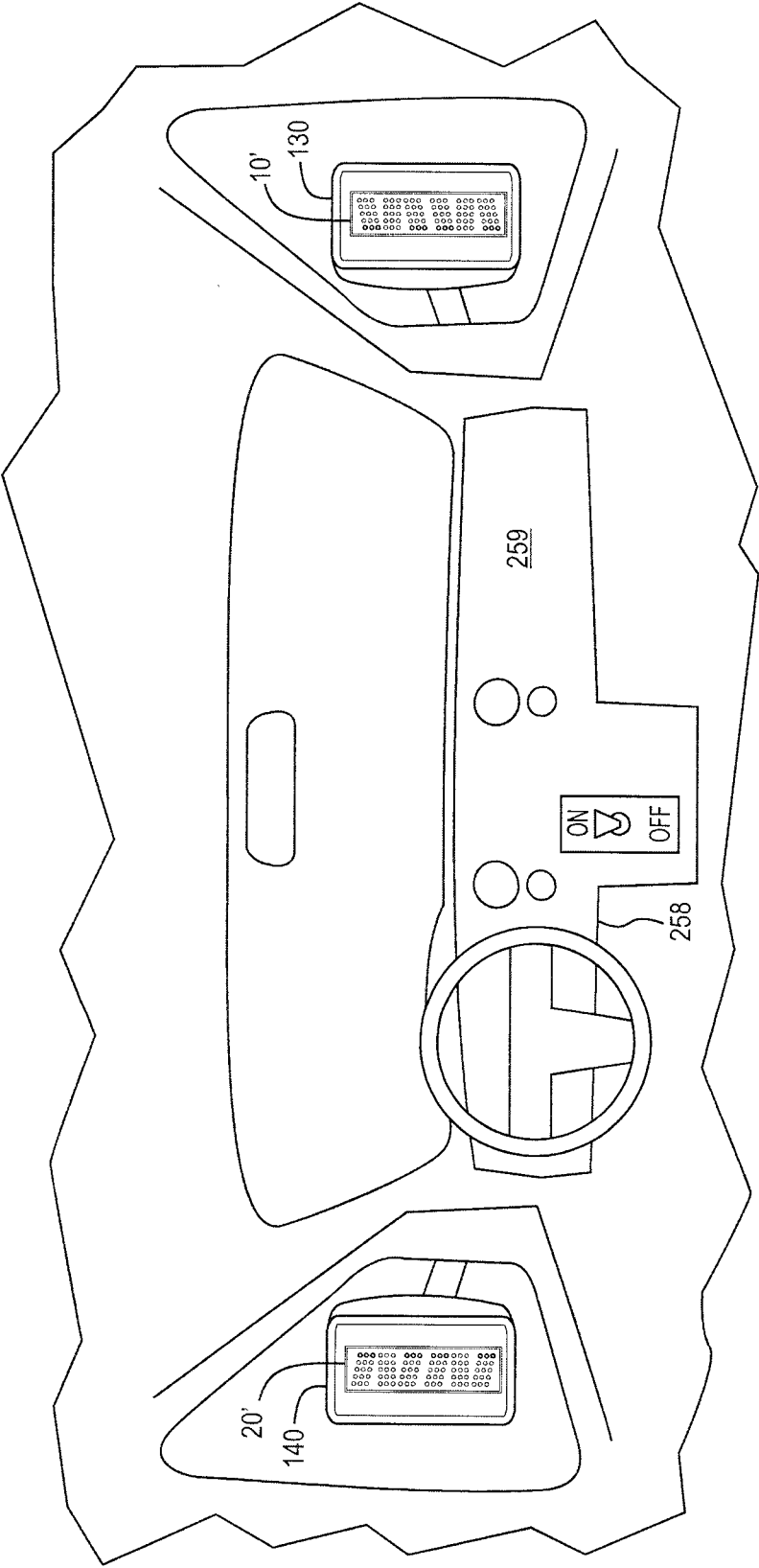


Fig. 6

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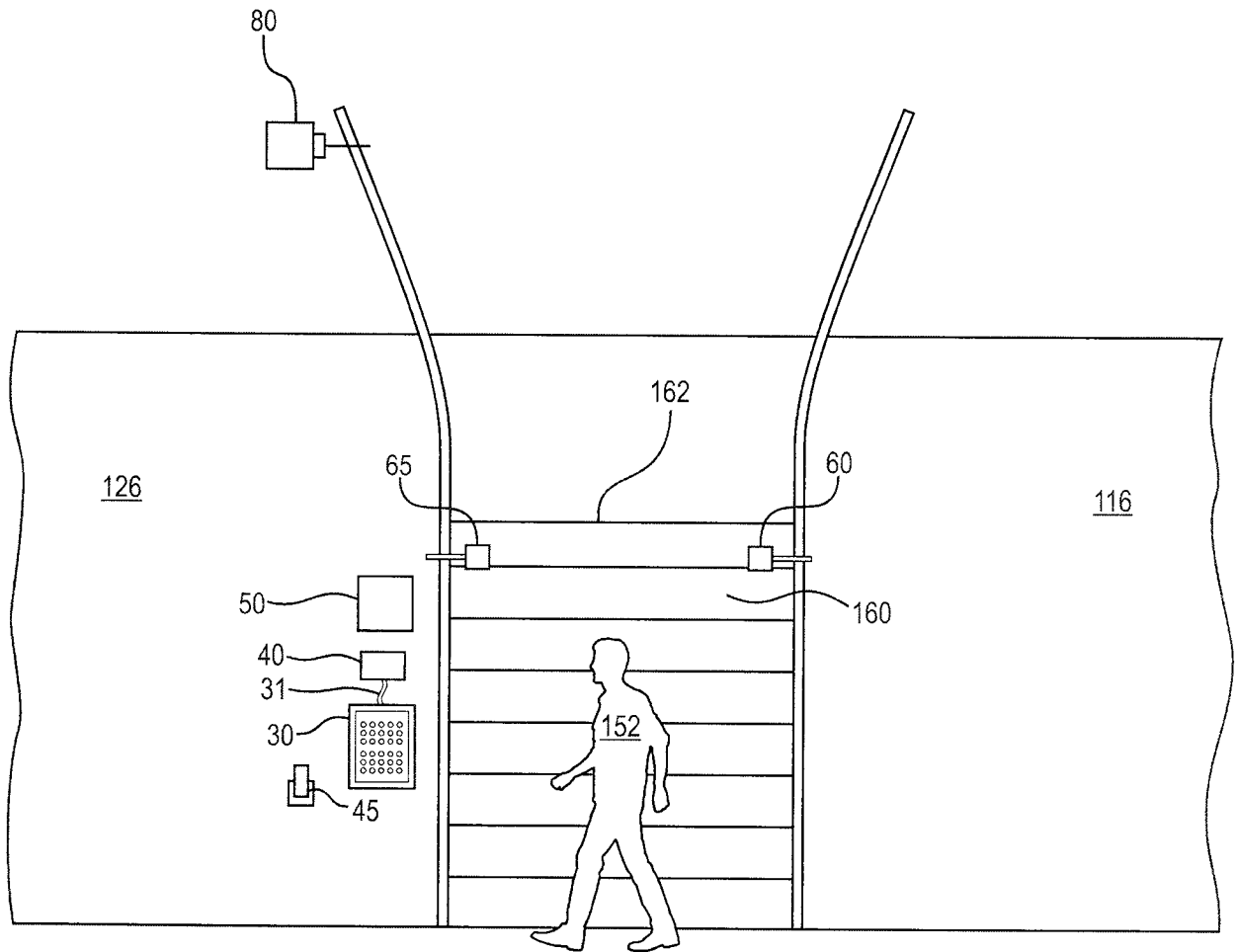


Fig. 7

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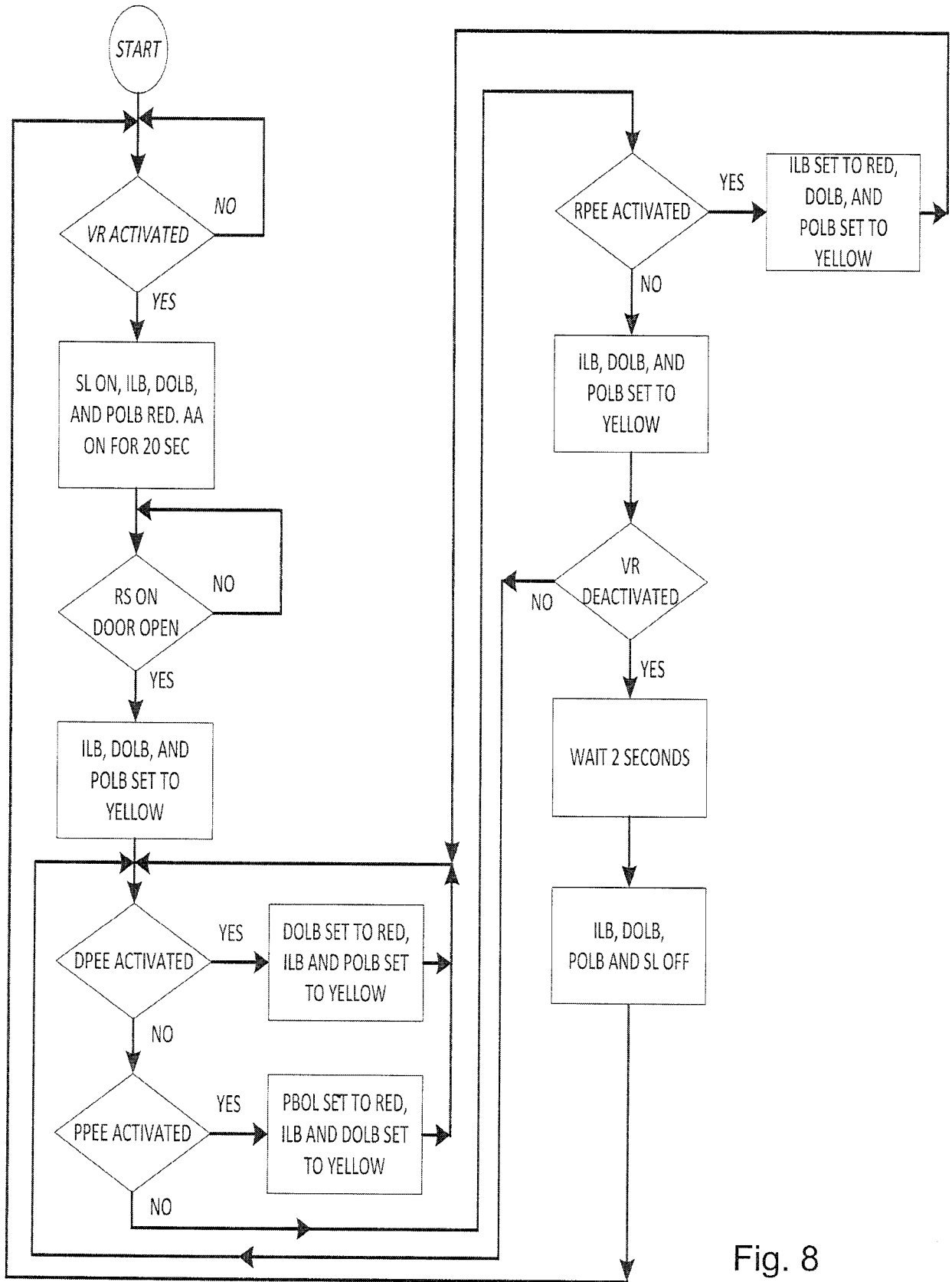


Fig. 8

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PRIORITY INTERRUPT SERVICE

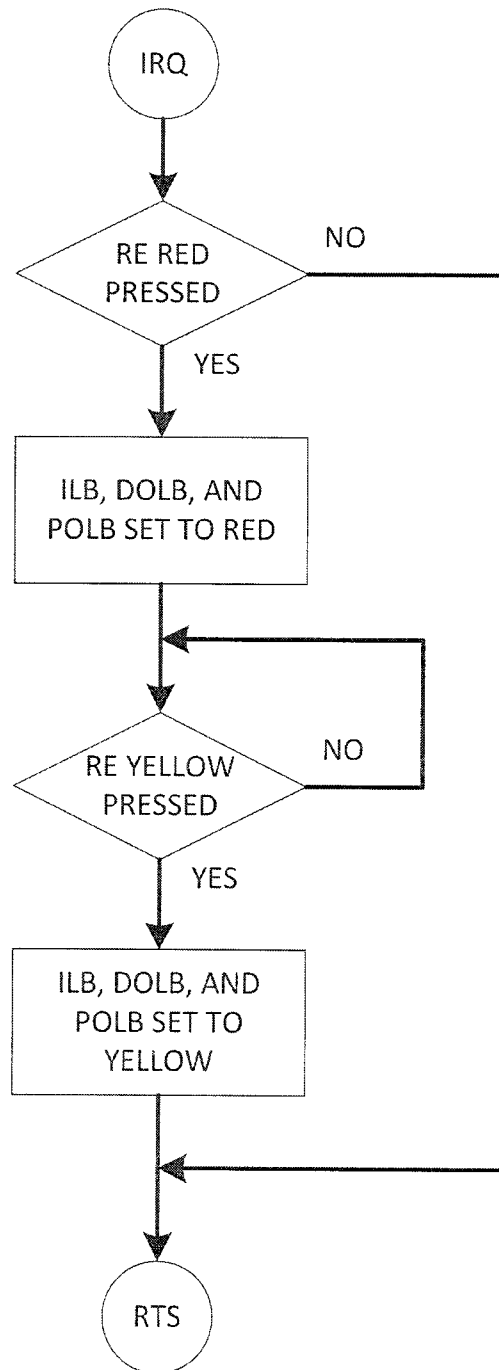


Fig. 9

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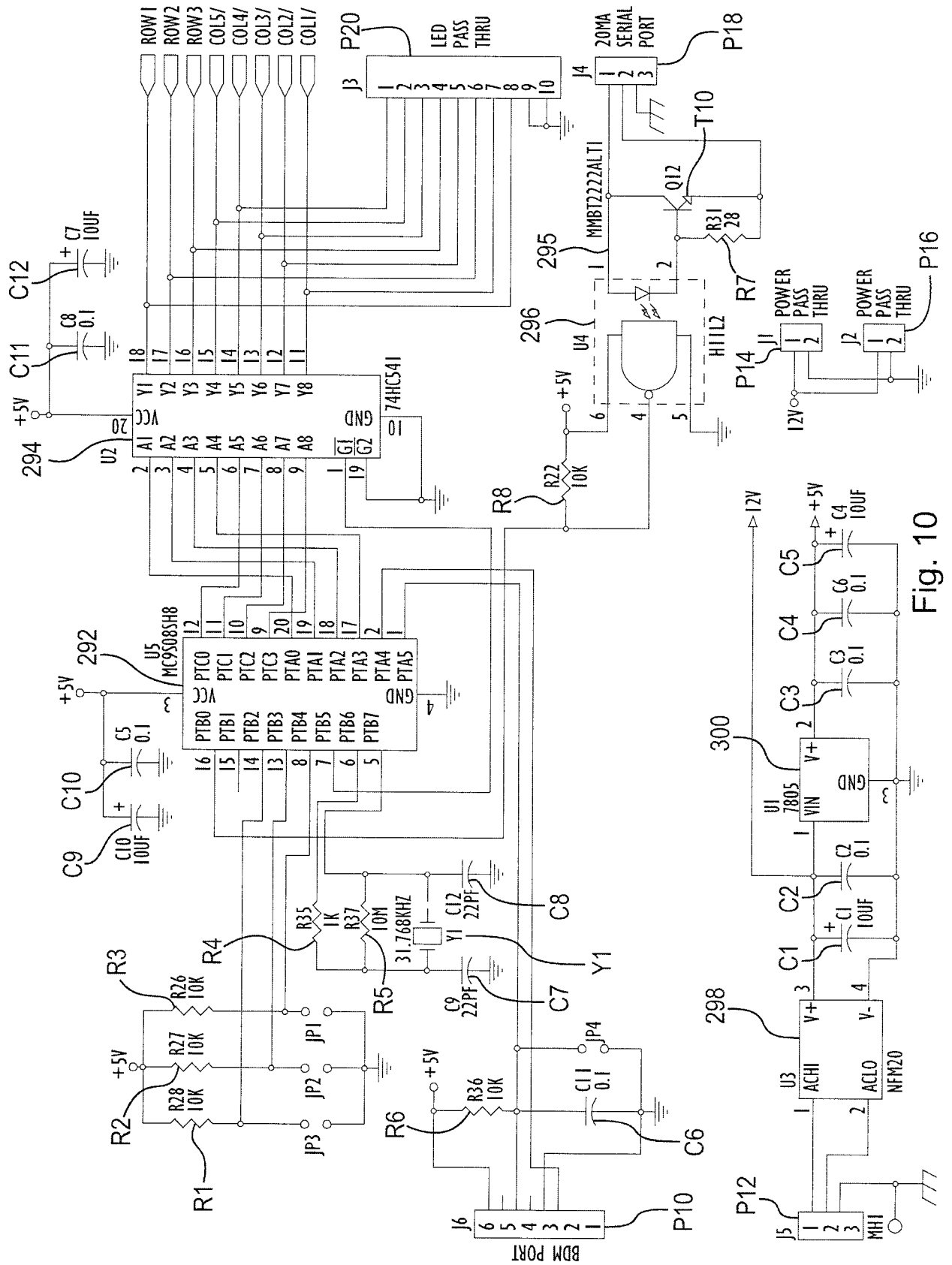


Fig. 10

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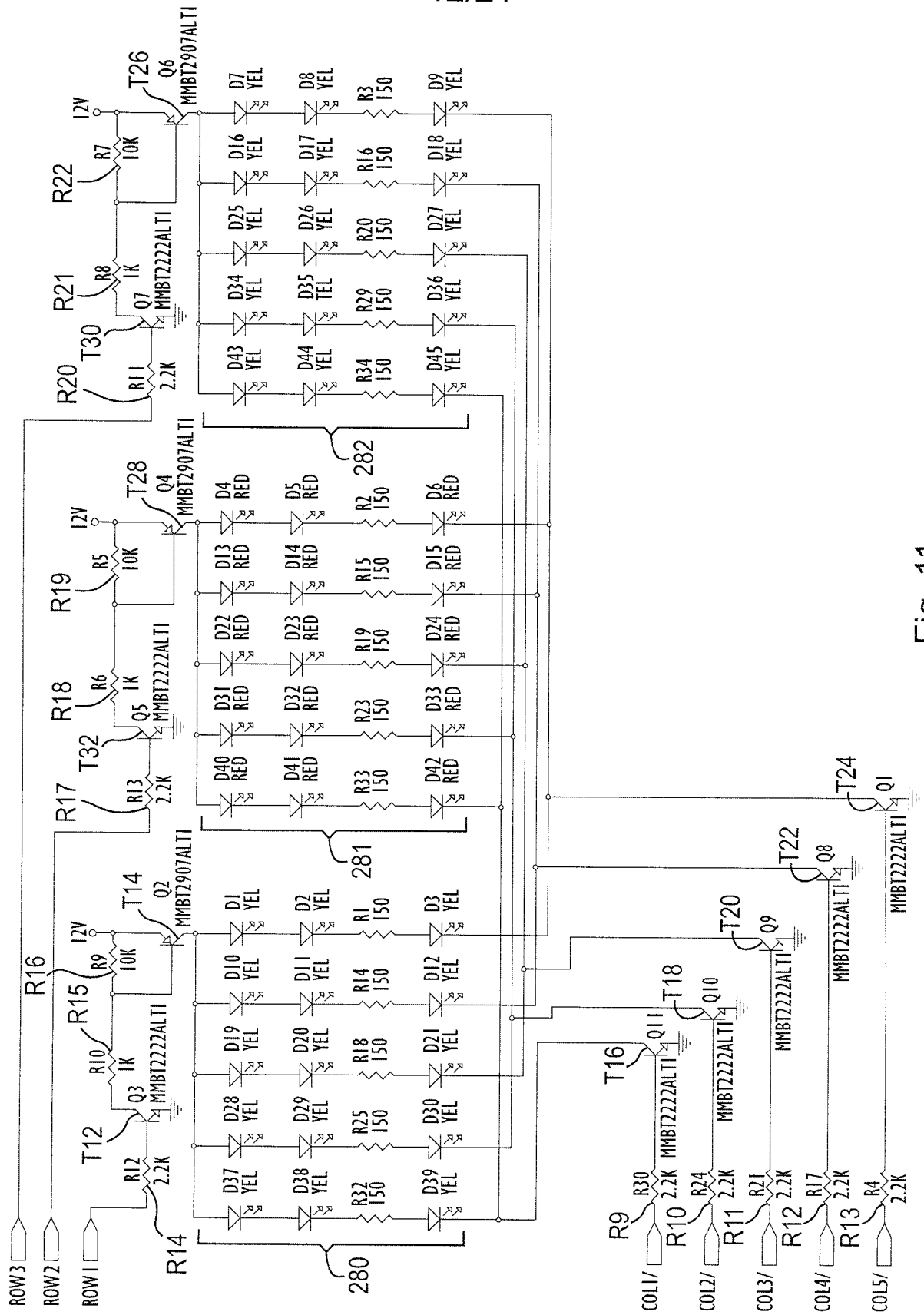
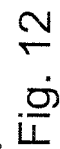


Fig. 11



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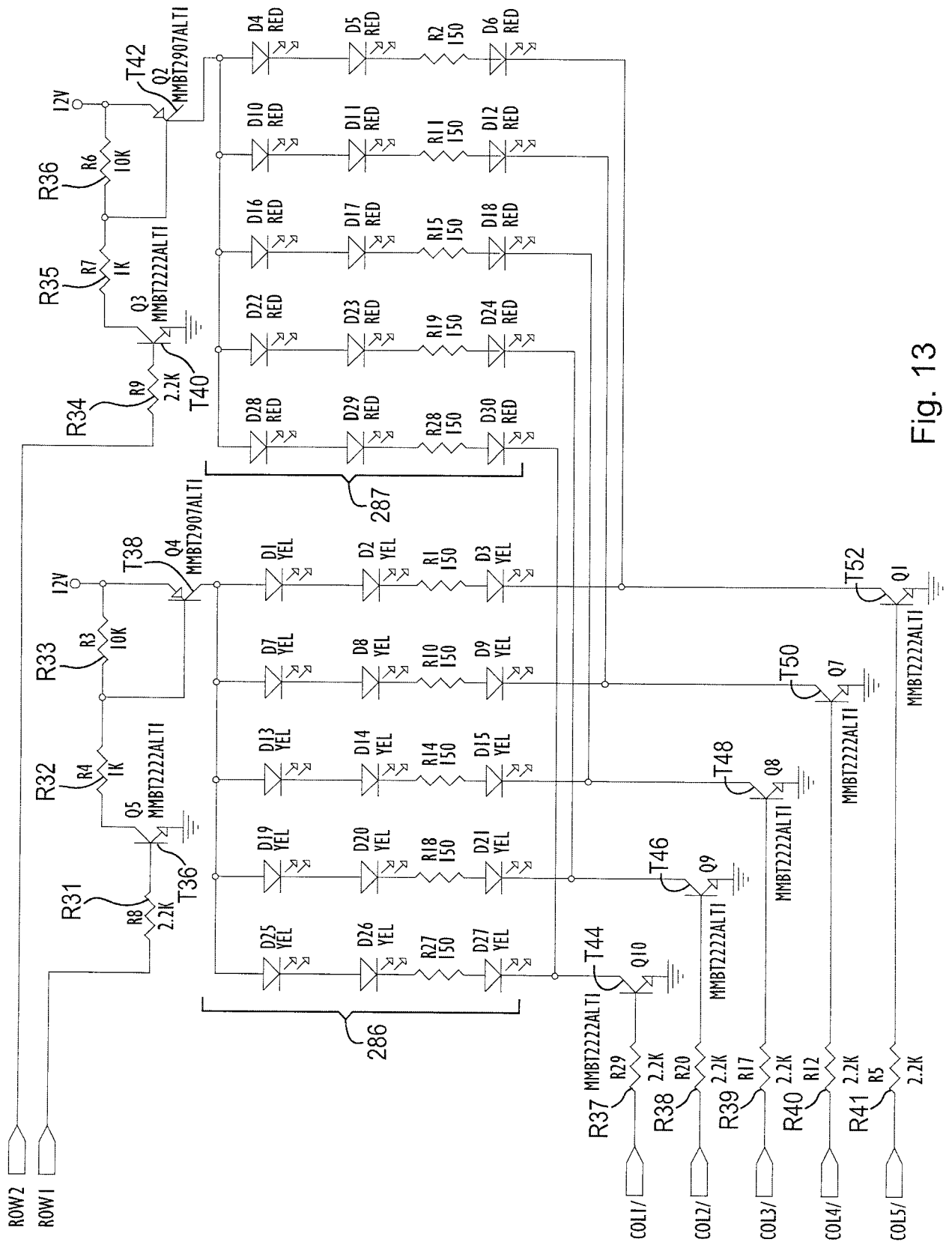
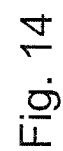


Fig. 13



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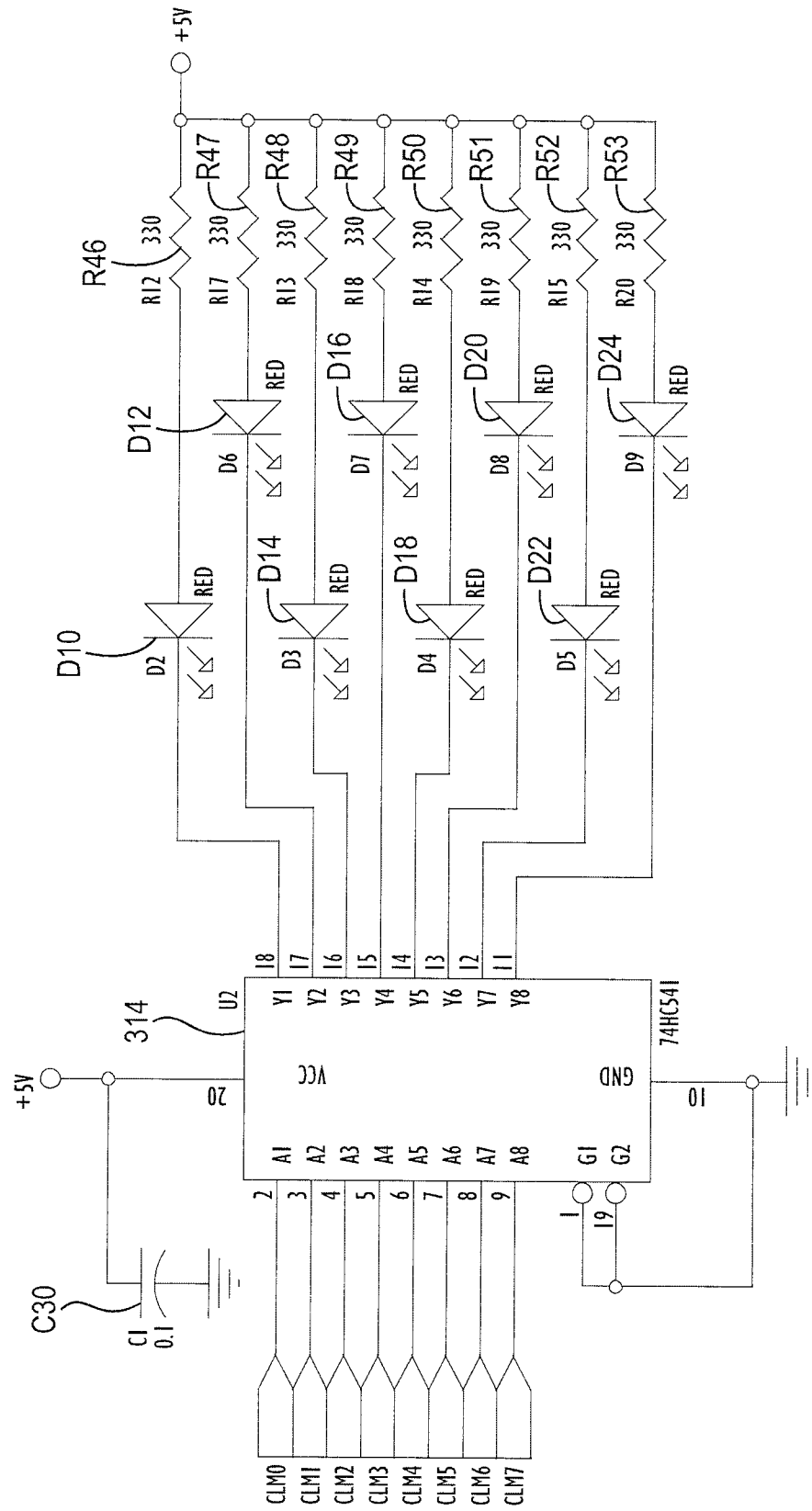


Fig. 15

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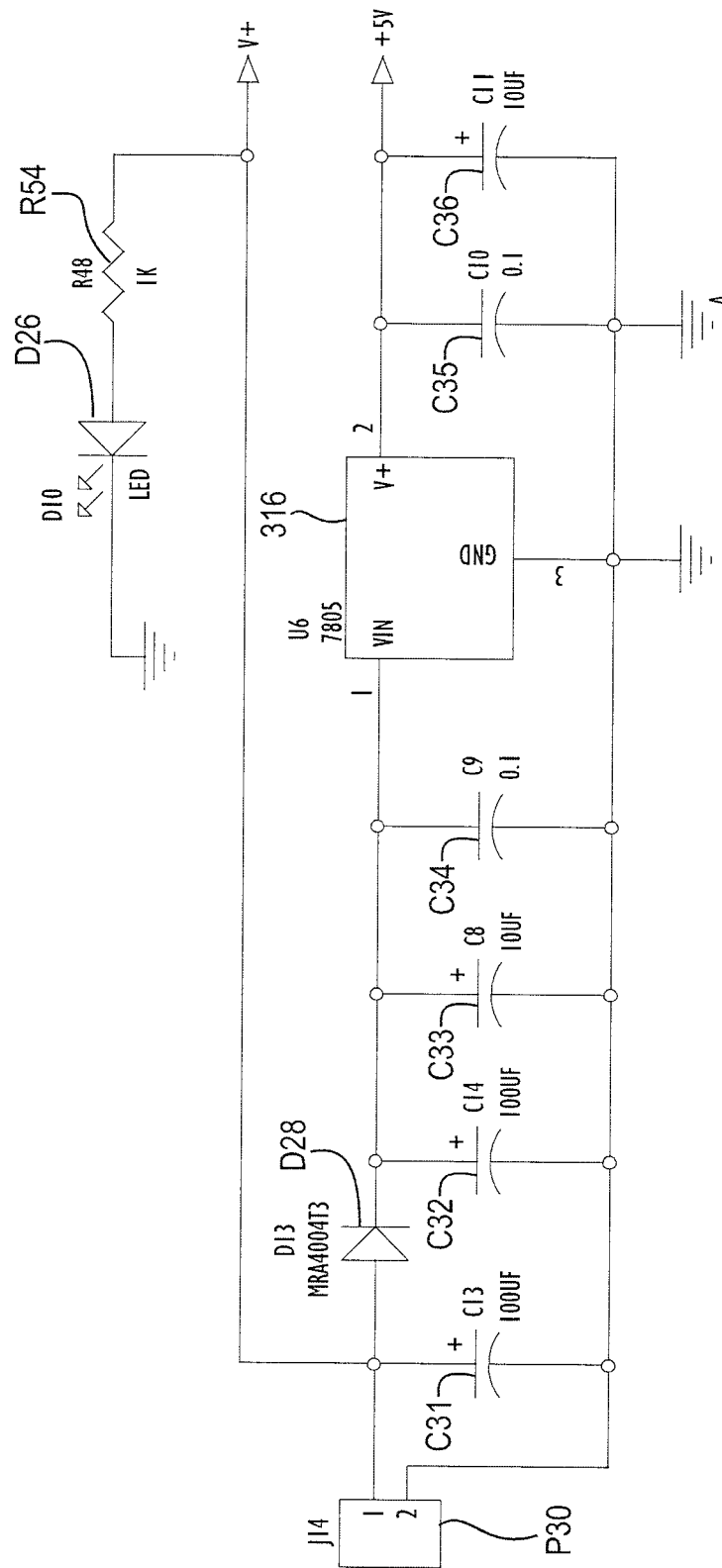
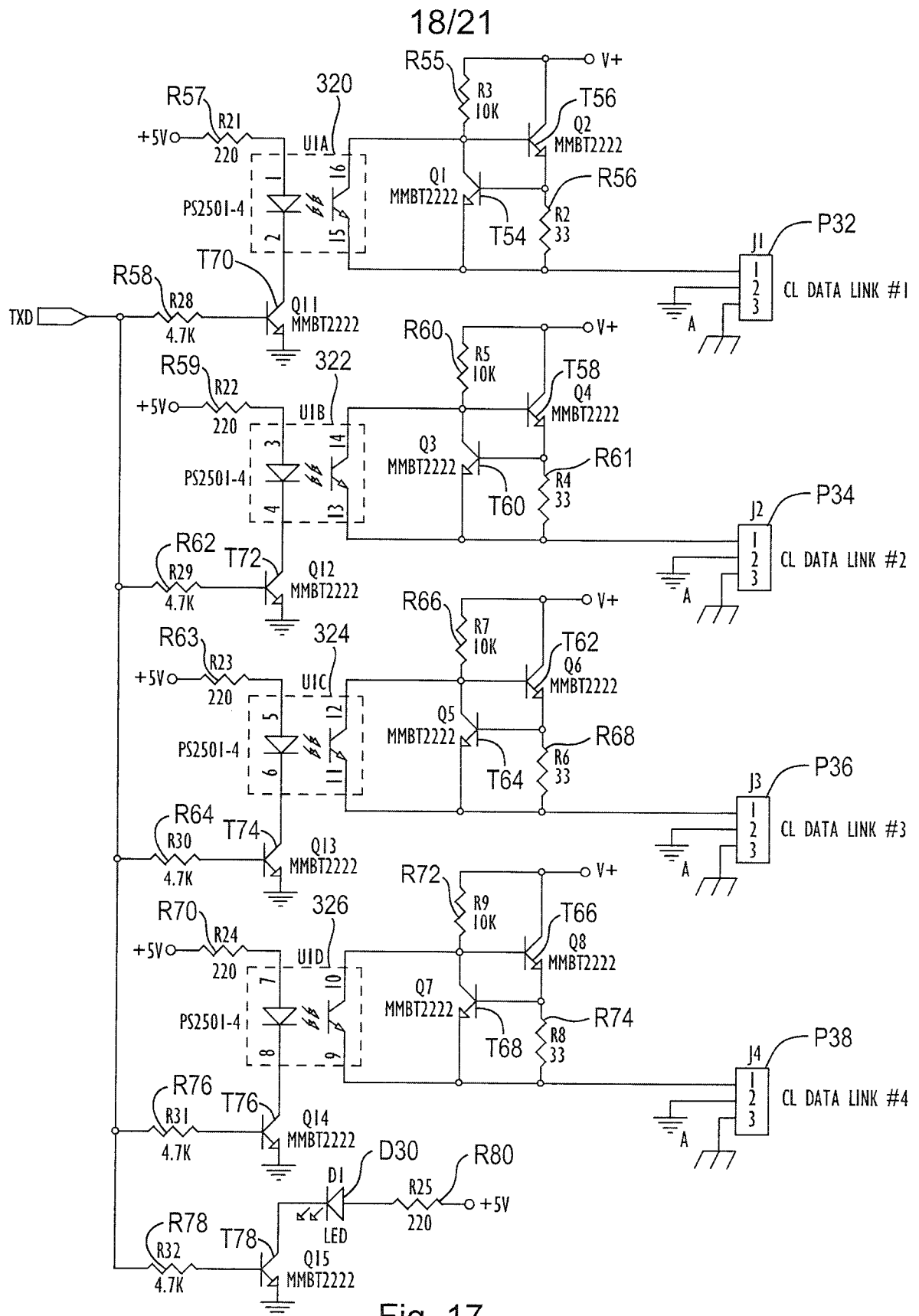


Fig. 16



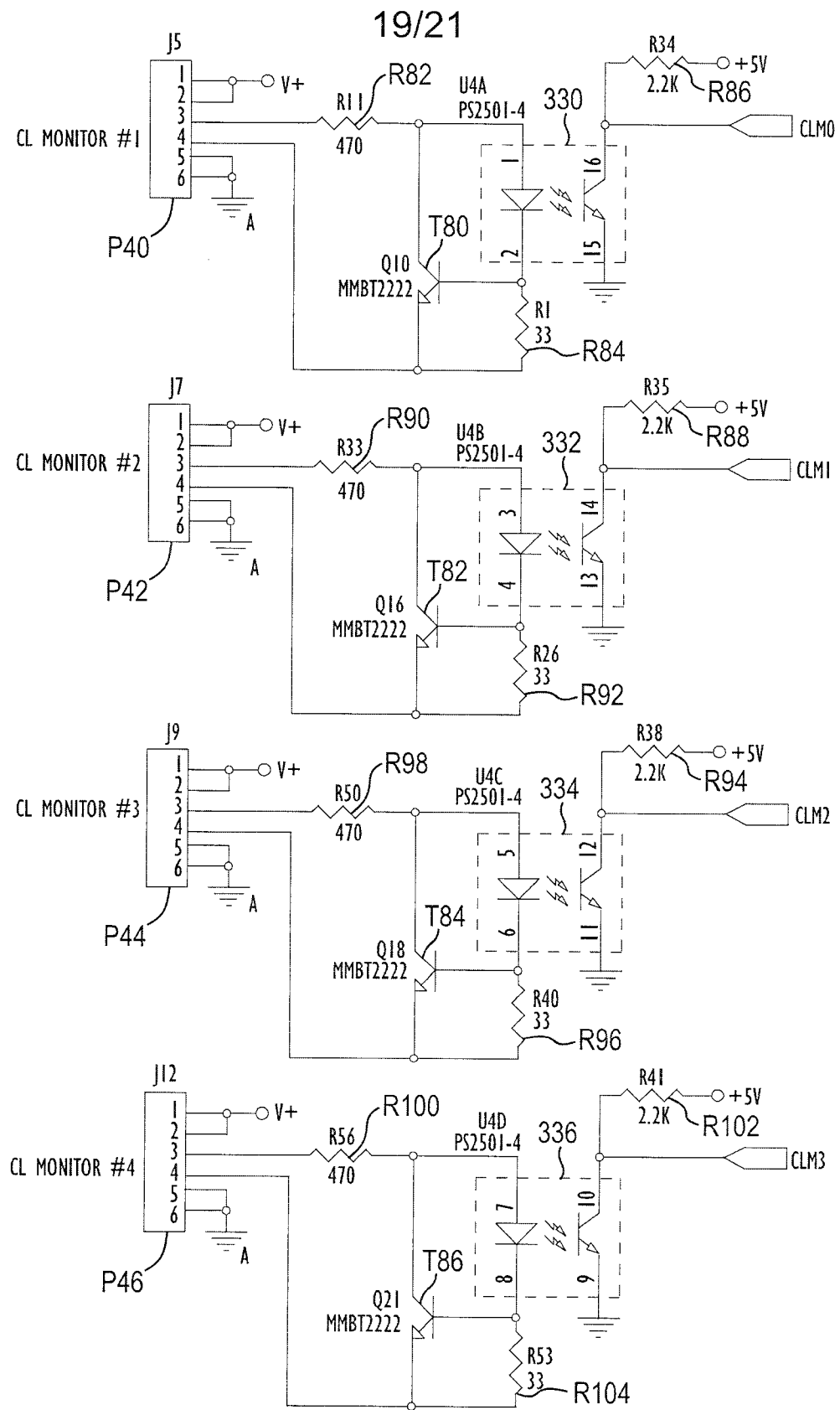
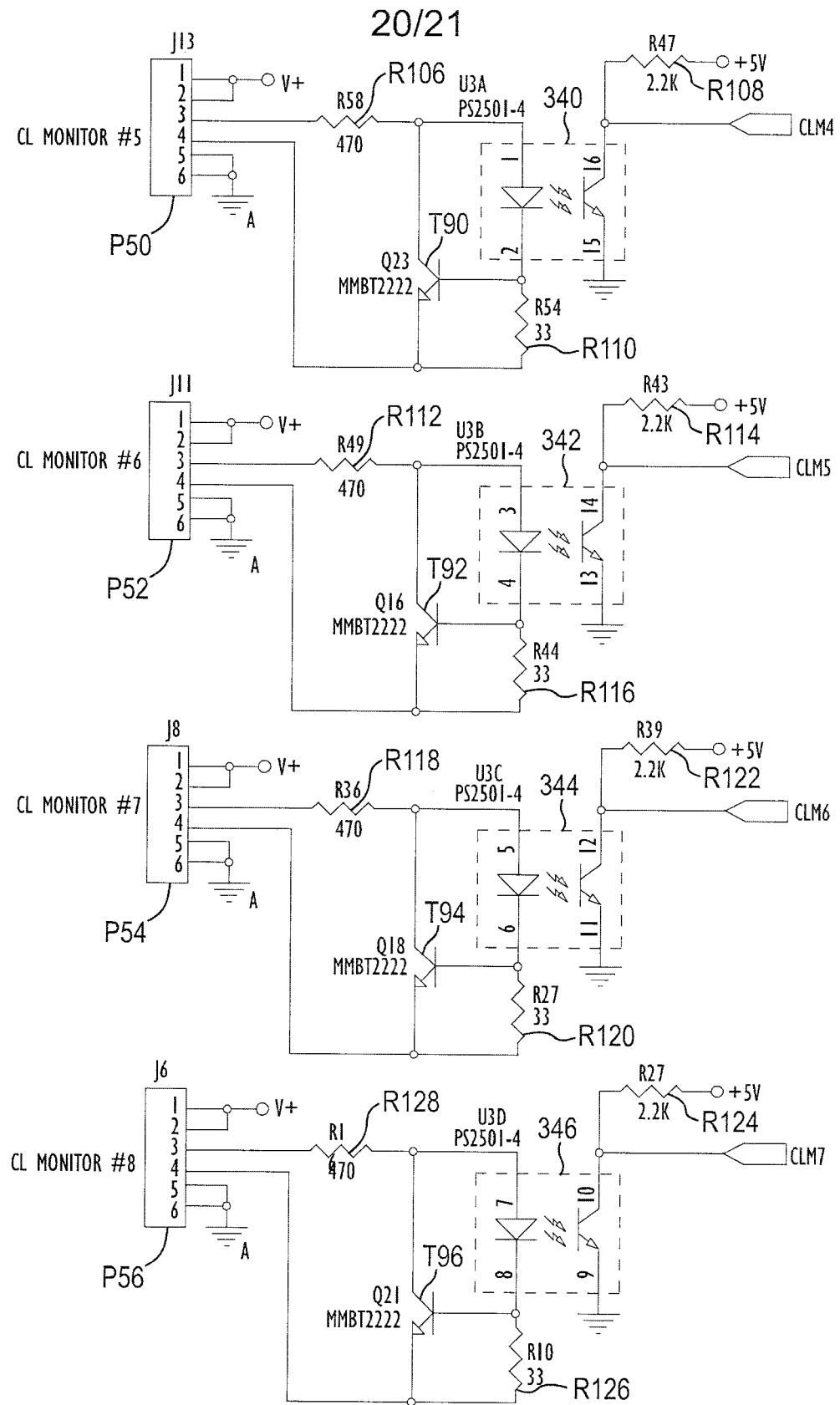


Fig. 18



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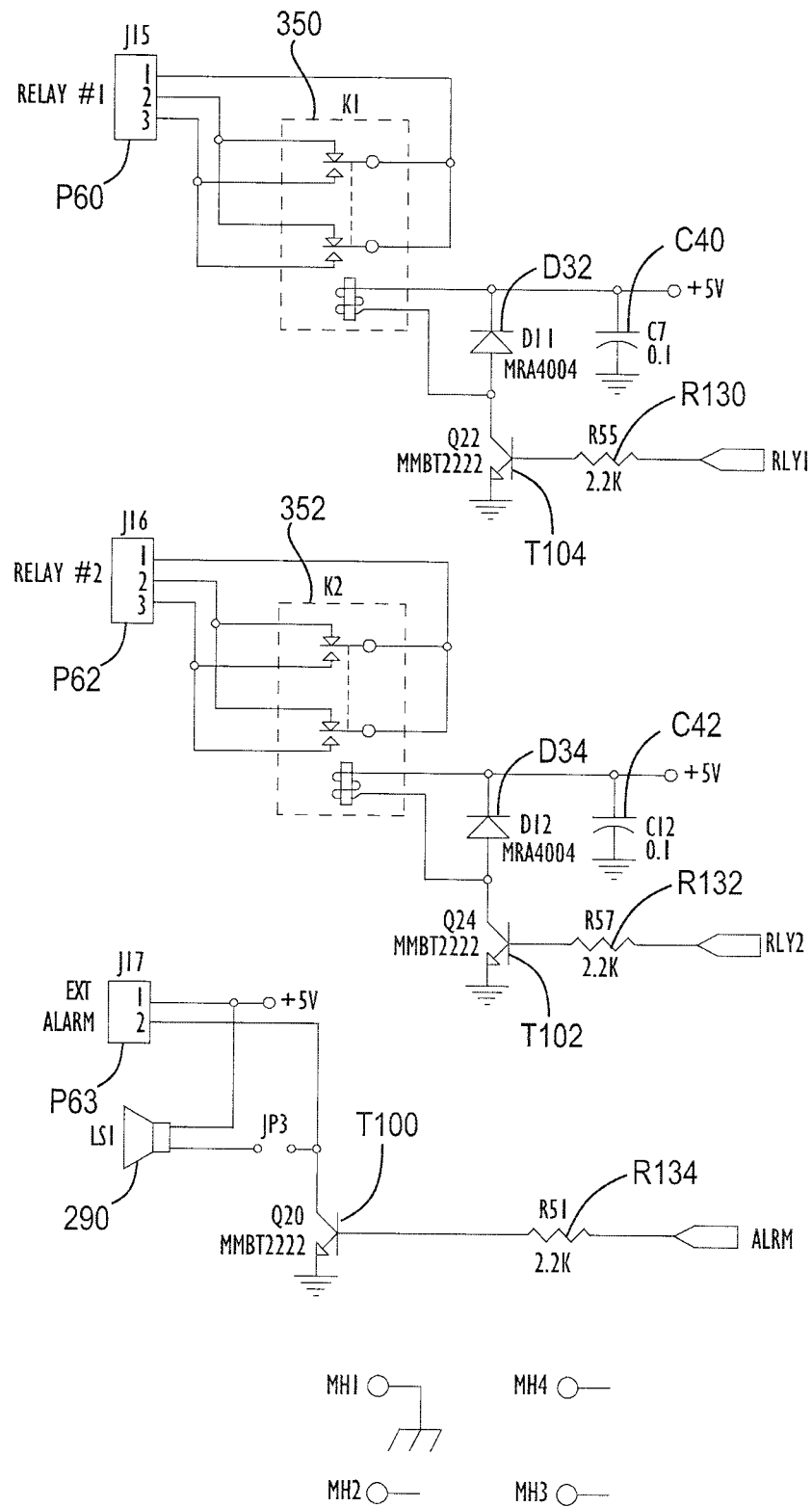


Fig. 20

