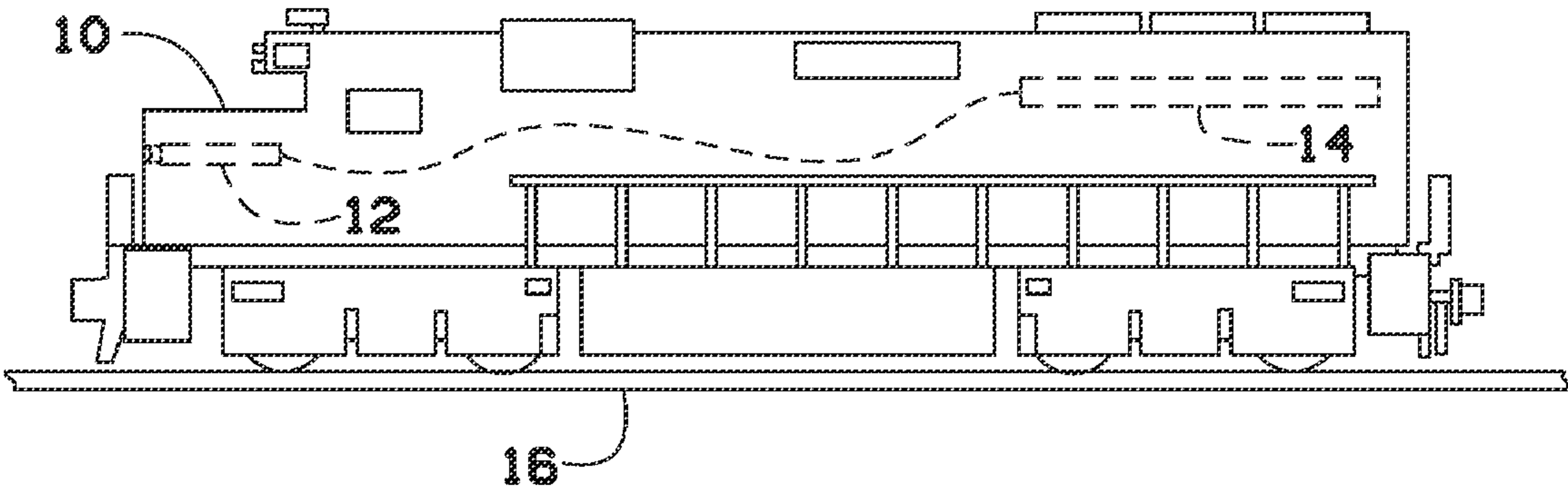




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(57) **Abrégé/Abstract:**
This invention relates to devices that enable a user to view a perspective view on a camera mounted to a model railroad train. Previously, the camera carrier wave of the camera was corrupted by inconsistent power going to the camera and interference from a model railroad engine, which is part of the model railroad train. The present invention uses a power supply circuit (14) to remedy the inconsistent power problem by removing spikes and gaps in power. A high gain antenna (31) remedies the interference problem by greatly increasing the reception of the camera carrier wave of the camera. Further, a battery management circuit can ensure that consistent power is provided to both the model railroad engine and the camera.

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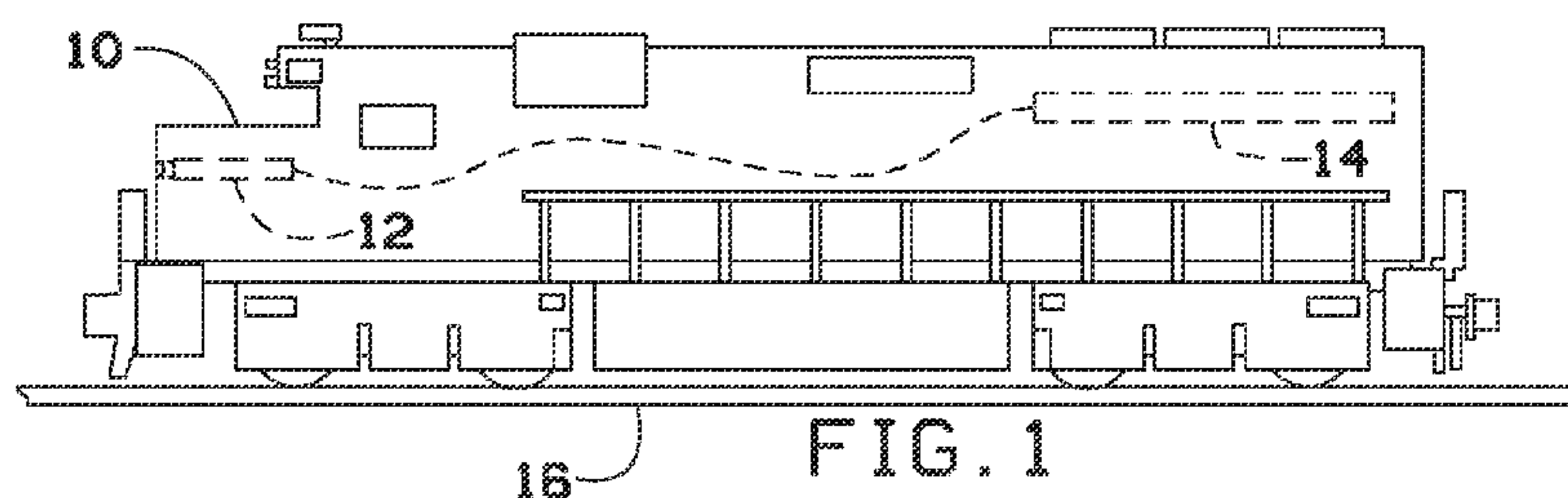
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WO 2013/078273 A1

WIRELESS VIDEO SYSTEM FOR MODEL RAILROAD ENGINES

TECHNICAL FIELD

[0001] This invention relates to devices comprising means or steps for providing communication or controlling between a recording/reproducing device and an additional device located close by, such as within a home.

BACKGROUND ART

[0002] Prior to the disclosed invention, a camera affixed to model trains suffered from signal transmission problems due to the electrical signal from the model railroad engine interfering with a wireless signal from the camera affixed to the model train to an output location. The prior art includes:

[0003] U.S. Patent 6,229,136 issued to Banks notes that realism is one of the primary goals sought by railroader hobbyists as they painstakingly build and operate their model railroad layouts. The hobbyist currently sees an un-realistic, overhead or aerial-like, view of the layout because of the relative size of the hobbyist to the size of the layout. In order to give the hobbyist the train engineer's viewpoint of the layout, the present invention installs a wireless video system inside any scale model railroad engine, which is picked up by a wireless receiver and displayed on a monitor or television (TV) screen or recorded on a Digital Video Recorder (DVR). Banks attempts to solve this problem with a camera that has a lens, which can move in reference to ambient light. While this would theoretically lead to a better image, it fails to account for the electrical interference caused by the model railroad engine and has no usable filtering theory.

[0004] EP Patent Publication 1,686,692 A2 filed by Blackwell explains that model railroading hobbyists go to great effort to make detailed, realistic scenery and layout in their chosen

scale of the real world. Blackwell recommends that a user can increase image effectiveness by adjusting lighting. While this is true, it teaches away from the present invention, which utilizes a power supply circuit to ensure consistent power to the camera.

DISCLOSURE OF THE INVENTION

[0005] A system transmits at least one perspective view from a model railroad train to video capture and prevents interference from a model railroad engine in the model railroad train. The system comprises the model railroad train further comprises the model railroad engine mechanically coupled to wheels such that the wheels are immediately adjacent to and electrically coupled to tracks. The tracks are electrically coupled to a power source such that electrical power flows from the power source through the tracks to the model railroad engine in order to power the model railroad engine along the tracks by turning the wheels.

[0006] The model railroad train is further mechanically and electrically coupled to a camera. The camera is electrically coupled to a power supply circuit such that the power supply circuit compensates for spikes and gaps in power supplied to the model railroad engine due to track anomalies. The camera is communicatively coupled to the video capture in the following manner: the camera is communicatively coupled to a wireless transmitter which transmits a camera carrier wave through a transmitting antenna. The transmitting antenna sends the camera carrier wave to a receiving antenna. The receiving antenna is communicatively coupled to a receiver. The receiver is communicatively coupled to the video capture.

[0007] The length of the transmitting antenna is proportional to the length of the camera carrier wave. The receiving antenna is a high-gain antenna. The use of the high-gain antenna enhances reception of the camera carrier wave produced by the camera to prevent ambient interference from distorting the camera carrier wave. In this manner, the video capture can display a camera carrier wave that is not distorted by the interference from the model railroad engine,

because the power supply circuit compensates for spikes and gaps in power supplied to the model railroad engine due to track anomalies providing a clean power to the camera.

[0008] The camera is communicatively coupled to a transmitting antenna, the length of which is based on a specific wavelength of the camera carrier wave. The camera carrier wave is communicatively linked to a receiving antenna, which can be a high-gain antenna, to capture the camera carrier wave. The receiving antenna is communicatively coupled to a receiver. The receiver is communicatively coupled to the video capture. The use of the high-gain antenna enhances the camera carrier wave produced by the camera to prevent the interference from distorting the camera carrier wave.

[0009] The power supply circuit further comprises a voltage regulator that dissipates excess voltage by increasing amperage output rather than dissipating the electrical power as heat. This provides the system much greater longevity both in terms of real-time periods of usage as well as extended lifetime of components. The power supply circuit further comprises an output where the output is electrically coupled to at least one rechargeable battery on the output of the power supply circuit for reserve power supply and to smooth out spikes and gaps to provide a specific direct current output voltage to the camera. The camera is further electrically coupled to a battery management circuit, where the battery management circuit can switch between providing the electrical power from the power source and providing the electrical power from the at least one rechargeable battery. The battery management circuit can direct the electrical power to charge the at least one rechargeable battery. In this manner, when the electrical power from the power source is interrupted, the battery management circuit switches from the power source to the at least one rechargeable battery in order to maintain a consistent flow of power to an intended device.

BRIEF DESCRIPTION OF THE DRAWINGS

[0010] Having thus described the invention in general terms, reference will now be made to the accompanying drawings, which are not necessarily drawn to scale, and wherein:

[0011] Fig. 1 shows a side view of a model railroad engine with one possible location for installation of the present invention.

[0012] Fig. 2 shows a circuit diagram of the switching power supply of the present invention.

[0013] Fig. 3 shows a system block diagram of the present invention.

[0014] Fig. 4 shows a second embodiment of the circuit diagram of the switching power supply of the present invention.

[0015] Fig. 5 shows the battery management circuit.

BEST MODE FOR CARRYING OUT THE INVENTION

[0016] Embodiments of the present invention overcome many of the obstacles associated with displaying video on model trains, and now will be described more fully hereinafter with reference to the accompanying drawings that show some, but not all embodiments of the claimed inventions. Indeed, the invention may be embodied in many different forms and should not be construed as limited to the embodiments set forth herein. Rather, these embodiments are provided so that this disclosure will satisfy applicable legal requirements. Like numbers refer to like elements throughout.

[0017] Fig. 1 shows a side view of a typical model railroad engine with the modifications of the present invention inserted. Of course, other rolling stock could be used for mounting the video system. The location of the intended device or camera 12 and the power supply circuit 14, illustrates one possible location depending upon the design of model railroad engine 10. As used

here an "intended device" means camera 12, a second camera 12 or individual components of camera 12. As is common, the model railroad train comprises model railroad engine 10. The smaller N and HO gauge engines as in Fig. 1, have one camera 12, but power supply circuit 14 has the capability to power two or more intended devices or cameras in these gauges as well as any larger gauges; for instance one camera pointing forward and one camera pointing backwards. In this configuration the view from model railroad engine 10 will be coming and going at the same time. As such, the power supply circuit 14 as shown in Fig. 1 was designed to minimize the footprint to afford greater flexibility for placement and positioning in the various available model railroad engine designs and scales from different locomotive model manufacturers. The model railroad engine is supported by tracks 16 and wheels 19 which conduct electrical power, either alternating current (AC) or direct current (DC), from the track 16 to power the power supply circuit 14. Notably, power supply circuit 14 can provide a specific direct current output voltage to camera 12 which helps to ensure a consistent camera carrier wave in camera 12. The camera carrier wave can be a video signal, an audio signal or an audio-video signal.

[0018] Fig. 2 shows the power switching system in more detail. The present invention receives power from the connectors 26 to a bridge rectifier 22 and at least one buffer capacitor 21 between bridge rectifier 22 and the remainder of the circuit to serve as buffering. The at least one buffer capacitor 21 also stores electrical power to smooth out spikes in the event that the model railroad engine passes over areas of a track that have poor electrical contact. Voltage regulator 24 refers to a preferred type of voltage regulator that dissipates excess voltage by increasing amperage output rather than dissipating the energy as heat. This provides the system much greater longevity both in terms of real-time periods of usage as well as extended lifetime of components. Power supply circuit 14 further compensates for spikes and gaps in power supplied to the model railroad engine due to track anomalies, providing clean power to camera 12.

[0019] Fig. 2 shows a power supply circuit 14 compatible with camera systems or other intended device with readily available AC adapters that do not match the needs of the camera 12 or other intended device. In these, a step-down circuit is included with the camera 12, which produces appreciable heat. Thus, this design is for use with the commercial camera 12 receiving power from output connectors 27 with all of the camera 12 circuitry intact. The remainder of the power supply circuit 14 consists of a network of resistors 18 and capacitors 20 that were empirically selected.

[0020] Fig. 3 is a block diagram of the present invention. Power is conducted from the track 16 to the model railroad engine 10 through the wheels 19 and then providing a voltage input 26 as shown in Fig. 2 and 4. Then, electricity flows through a bridge rectifier 22, and emerging as a DC positive input 28 and negative input (not shown) and then into the voltage regulator 24 emerging as DC positive output 30 and DC negative output 32. One or more output capacitors 20 as shown in Fig. 2 and Fig. 4 and at least one rechargeable battery 38, which can be a chip battery or Lithium polymer battery, which is recharged by the output of the power supply circuit 14 directed through a battery management circuit detailed in Figure 5, all of which maintain a constant output for the camera(s) 12 input. Camera 12 transmits video images on a camera carrier wave via a built-in antenna (not shown). Camera 12 is communicatively coupled to a built-in antenna, a length of the transmitting antenna is proportional to a length of the camera carrier wave. The use of the length of the camera carrier wave to determine the length of the transmitting antenna enhances the camera carrier wave produced by the camera to prevent the interference from distorting the camera carrier wave. The camera carrier wave is received by an antenna attached to a wireless receiver, which may be a high-gain antenna 31. The commercial high-gain antenna 31 increases the signal to noise ratio where other wireless devices are in close proximity to the camera system and thereby reduces ambient interference. Lastly, the receiver output is a signal that may be either displayed on a video capture 31 or alternatively on a monitor/TV or on any video recording system.

[0021] Fig. 4 shows another embodiment that reduces the heat output found in the first circuit seen in Fig. 2, and delivers the exact voltage that the camera 12 or other intended device needs without the step-down circuit. This embodiment also substitutes resistors 18 and capacitors 20 that have different output values, and a diode 34, that differ from those found in the circuit seen in Fig. 2. Moreover, some of the components illustrated in the design in Fig. 2 were found to be unnecessary for the direct output circuit and have been removed. Fig. 4 also shows a battery 38, which is rechargeable by the output of the switching regulator 24 through the battery management circuit detailed in Figure 5, thereby maintaining a constant output to the camera 12 in the event power to the power supply circuit 14 is interrupted. In like manner, the battery and management circuit 38 may also be inserted into the power supply circuit 14 found in Fig. 2 in the same position of the circuit to serve the same function. The remainder of the power supply circuit 14 consists of a network of resistors 18 and capacitors 20 that were empirically selected. Connectors 26 supply power at the input to the bridge rectifier 22 and connectors 27 provide output from the power supply circuit 14 directly to the battery management circuit detailed in Figure 5 and thus removing the camera step-down circuit.

[0022] Figure 5 provides a detailed diagram of the battery management circuit represented as item 38 in the block diagram in Figure 3. The Battery Management Circuit (BMC) allows the camera 12 or other intended device to receive continuous power regardless of the track contact status. This circuit will immediately power the camera directly from the track source connection 27 regardless of the battery charge status. While the track source is in use, the BMC will fully charge the battery. Once the battery is fully charged, the BMC senses the charge status and ceases further charging until the battery is used as the power source. When the track contact fails, the battery will instantly become the power source for the camera 12 or other intended device. The BMC also has a timer as part of the design that will allow for setting a maximum time after track contact is lost to

turn off the battery as a source of power such as removal of the camera system mounted rolling stock from the rails for storage until the next usage. Thus, the timer feature would become an automatic on/off switch to assure that the battery will never be discharged to the point of damage. As an alternative to this feature, the battery lead to the camera may have an additional switching mechanism. This additional switching mechanism may be a wired manual switch mounted on the exterior surface of the rolling stock. Moreover, in the case of a decoder controlled engine, one of the programmable decoder configuration variables (CVs) may be set to switch the camera on and off by wiring to the decoder sites controlled by the selected CV. Thus, through the use of a digital command control (DCC) throttle, the CV could be used to turn the camera on and off to assure that the battery is not drained to the point of damage. The present invention allows the hobbyist to retrofit their existing engines with easily installed kits. Model railroad suppliers can also provide the at least one perspective view such as a first person perspective view or an engineer's view as a factory-installed option in various locomotives or other rolling stock using the present invention.

[0023] The BMC may also be used to manage power to the model railroad engine via appropriately selected battery or batteries and wiring to the model railroad engine contact points directly (in the case of a DC powered engine) or to the model railroad engine contact points of a decoder (in the case of a DCC controlled engine). Thus, when a system equipped model railroad engine passes over track with poor wheel to rail contact, the BMC would provide alternate power to the model railroad engine's motor. Likewise, when electrical power from the power source is interrupted, the battery management circuit switches from the power source to the at least one rechargeable battery in order to maintain a consistent flow of power to the components.

INDUSTRIAL APPLICABILITY

[0024] The primary objective of the present invention is to give model railroaders a true Engineer's View or first person perspective of their model railroad layout with an economical

system. Another objective is to miniaturize the system to fit in locomotives built by various manufacturers from the largest scales down to "N" scale and "Z" scale.

[0025] Another objective of the present invention is to solve the problems of voltage spikes and momentary pauses in wheel to track contact causing voltage gaps on both engine and camera system operation and reliability. Another objective of the present invention is to transmit the video signal from the engine or other rolling stock to the receiver wirelessly. Another objective is to receive a transmitted signal to provide a realistic and stable video image of the Engineer's View or first person perspective on a video screen or recorded on a digital video recorder (DVR) or other recording device.

THAT WHICH IS CLAIMED

1. A model railway train for use in a system that transmits at least one perspective view from a model railroad train to video capture and prevents interference from a model railroad engine in the model railroad train, the train comprising:

- a model railroad engine mechanically coupled to wheels, whereby in use when the wheels are immediately adjacent to and electrically coupled to tracks which are electrically coupled to a power source, electrical power flowing from the power source through the tracks to the model railroad engine in order to power the model railroad engine along the tracks by turning the wheels;

- a mechanically connected camera;

- a power supply circuit;

wherein the camera is electrically coupled to the power supply circuit, the power supply circuit comprising:

- a bridge rectifier in series with a voltage regulator that dissipates excess voltage by increasing amperage output rather than dissipating the electrical power as heat;

- an output where the output is configured to be electrically coupled to at least one rechargeable battery on the output of the power supply circuit for reserve power supply and to smooth out spikes and gaps to provide a specific direct current output voltage to an intended device, the power supply circuit compensating for spikes and gaps in power supplied to the model railroad engine due to track anomalies; and

- a battery management circuit configured to switch between providing the electrical power from the power source and providing the electrical power from the at least one rechargeable battery, the battery management circuit further configured to, when the electrical power from the power source is interrupted, switch from the power source to the at least one rechargeable battery to maintain a consistent flow of power to the intended device, wherein the camera is further electrically coupled to the battery management circuit;

wherein the camera is configured to be communicatively coupled to the video capture, such that the video capture can display a camera carrier wave that is not distorted

by the interference from the model railroad engine, because the power supply circuit compensates for spikes and gaps in power supplied to the model railroad engine due to track anomalies providing a clean power to the camera.

2. The model railway train of Claim 1, wherein the camera is communicatively coupled to a wireless transmitter which transmits a camera carrier wave through a transmitting antenna;

the transmitting antenna is configured to send the camera carrier wave to a receiving antenna, wherein the receiving antenna is communicatively coupled to a receiver and the receiver is communicatively coupled to the video capture;

a length of the transmitting antenna is proportional to the length of the camera carrier wave;

the use of the length of the camera carrier wave to determine the length of the transmitting antenna enhances the camera carrier wave produced by the camera to prevent the interference from distorting the camera carrier wave.

3. The model railway train of Claim 2, wherein the receiving antenna is a high-gain antenna in order to enhance reception of the camera carrier wave and to avoid ambient interference.

4. The model railway train of claim 1,

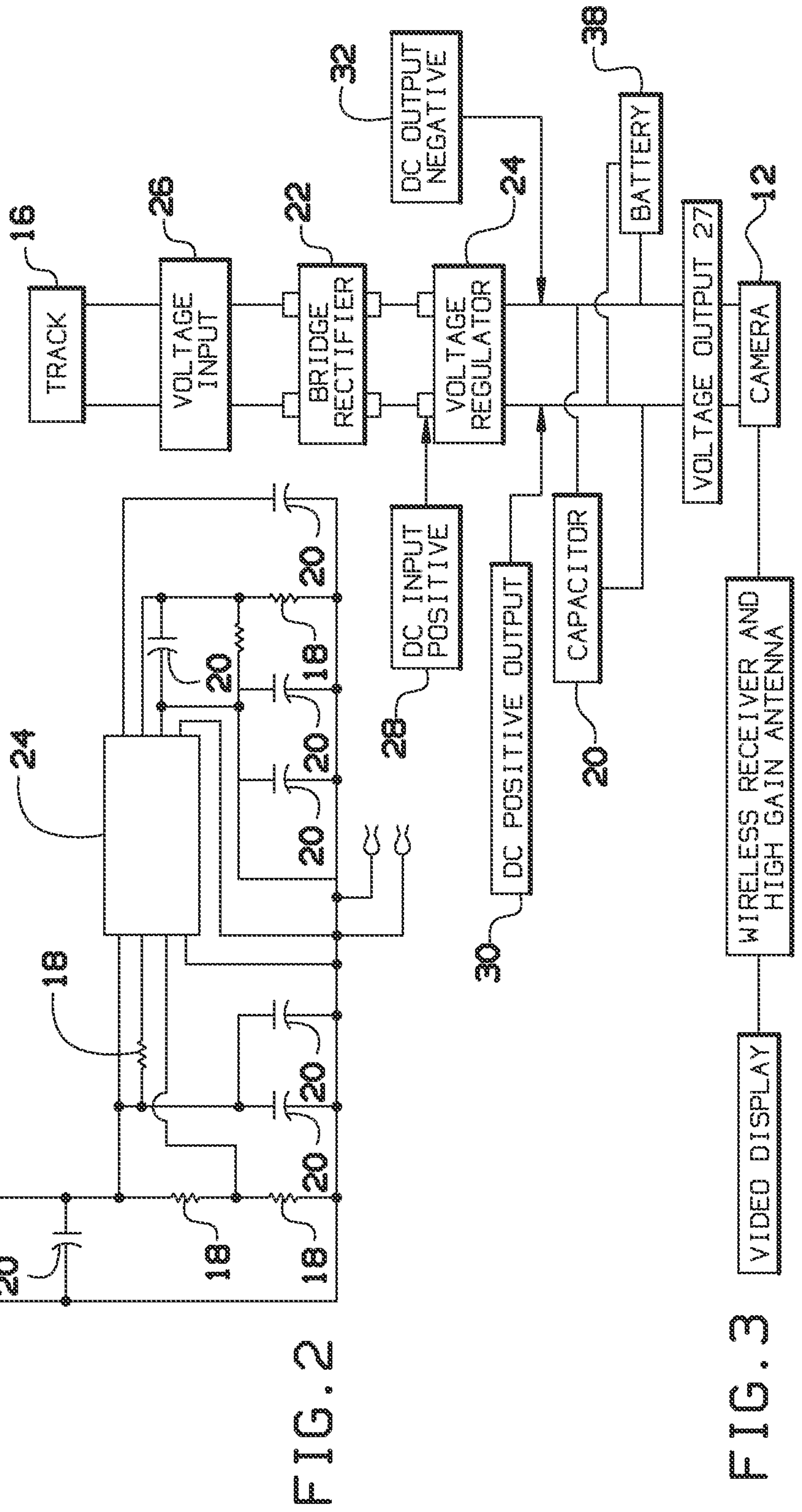
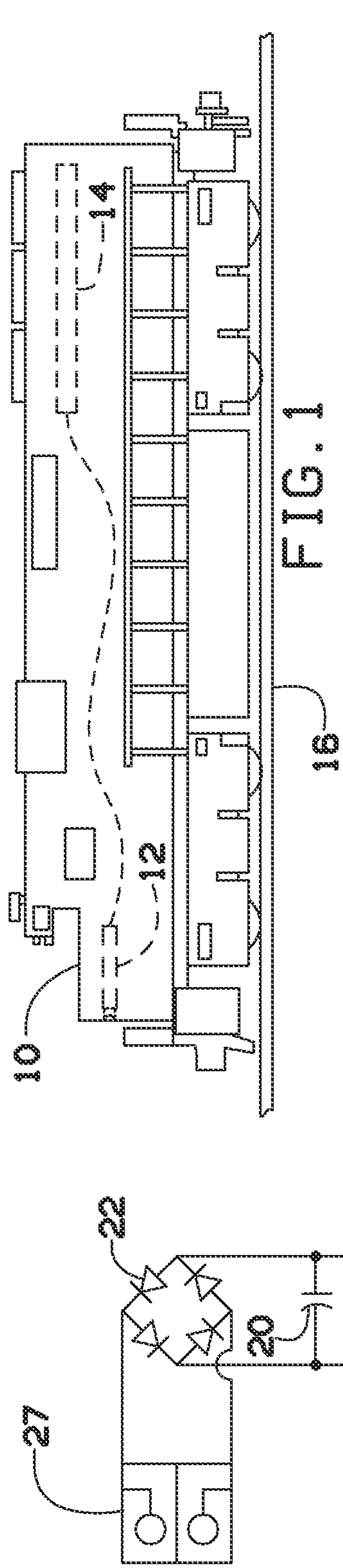
the power supply circuit further comprising at least one buffer capacitor to smooth out spikes and gaps in power supplied to the model railroad engine due to track anomalies providing the clean power to the intended device.

5. The model railway train of claim 1,

wherein the battery management circuit is configured to direct the electrical power to charge the at least one rechargeable battery.

6. The model railway train of claim 1, wherein the intended device is the camera.

7. The model railway train of claim 1, wherein:
the model railroad engine is electrically coupled to the power supply circuit; and
the battery management circuit is further configured to, when the electrical power from the power source is interrupted, switch from the power source to the at least one rechargeable battery to maintain a consistent flow of power to the model railroad engine;
whereby the model railroad engine will continue to run smoothly regardless of spikes and gaps due to track anomalies.



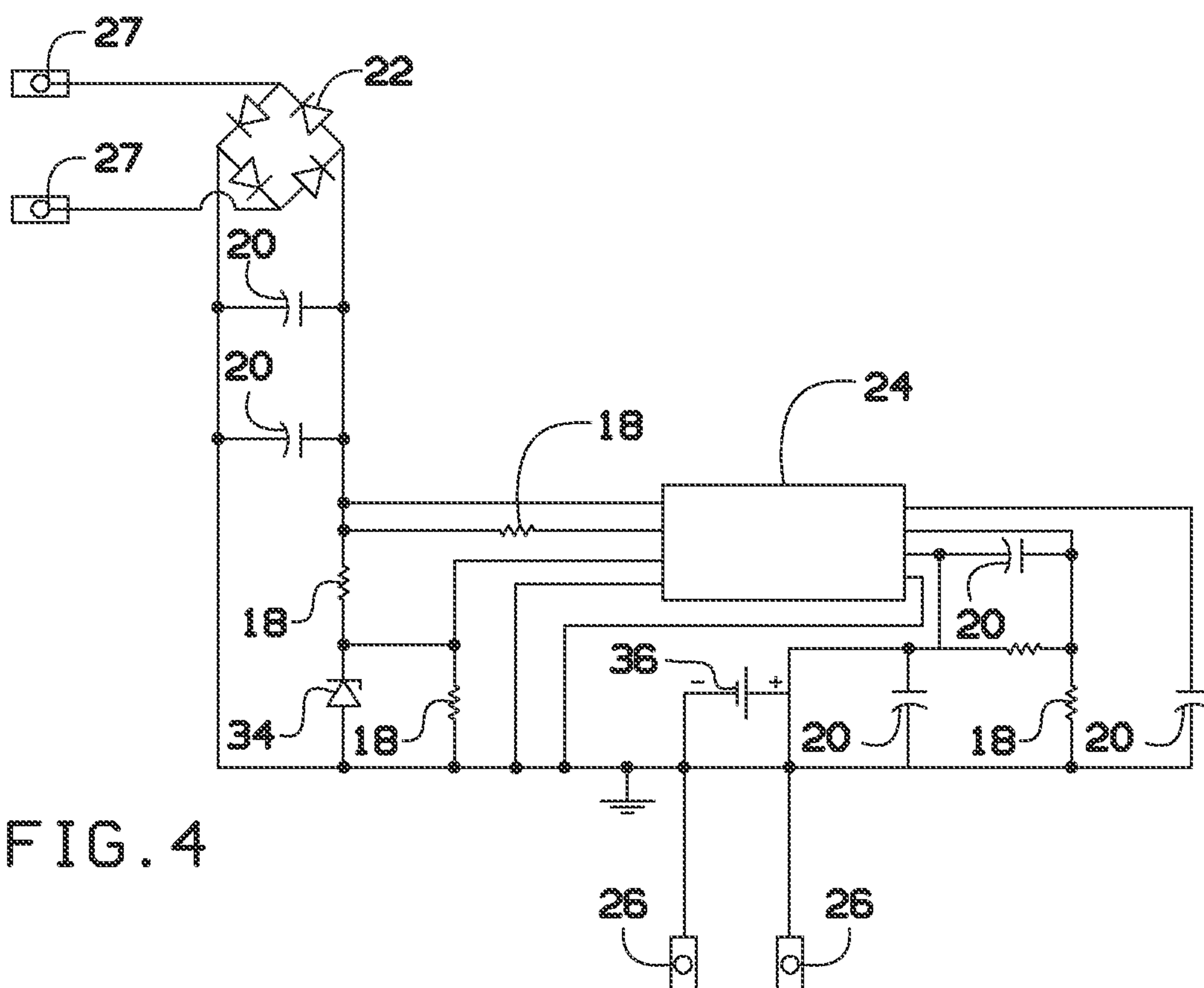


FIG. 4

38

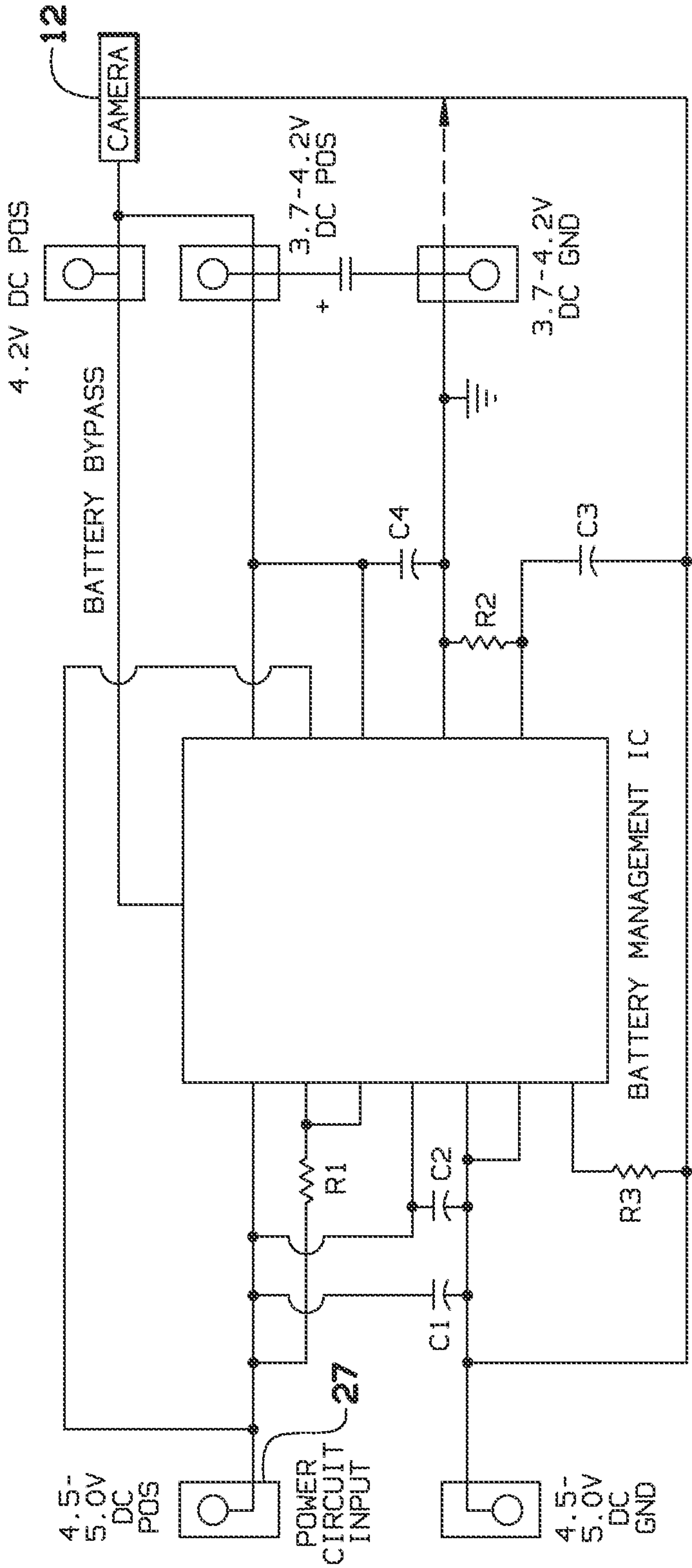


FIG. 5

