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COILLESS BUS COUPLER FOR AN ON-BOARD POWER SUPPLY
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- (56) Prior Art Documents
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- (57) Claim

1. A device for providing the vehicle power supply voltage for a bus coupler without a transformer, for coupling to a bus (bus conductors 1, 2), which carries information and power, of a bus system, in particular for building system technology, a coupling circuit (3) being connected via the control input (4) to a drive circuit (5) which has inputs (6, 7) for a control criterion, the coupling circuit (3) being constructed and designed in such a manner that it operates in the manner of a constant current source for the information frequencies and operates as a control circuit, in conjunction with the drive circuit (5), for lower frequencies, the coupling circuit (3) being operatively connected in series with an energy storage capacitor (8) for picking off the vehicle power supply voltage, and the series circuit being operatively connected to the bus conductors (1,2), characterized

in that

the coupling circuit (3) has a transistor (13) whose emitter forms, via a resistor (14), one pole (11) of the coupling circuit, to which pole (11) a capacitor (15) is

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also connected, which capacitor (15) is connected on its other side to the base, which is used as a control input (4), of the transistor (13), whose collector forms the other pole (12) of the coupling circuit.



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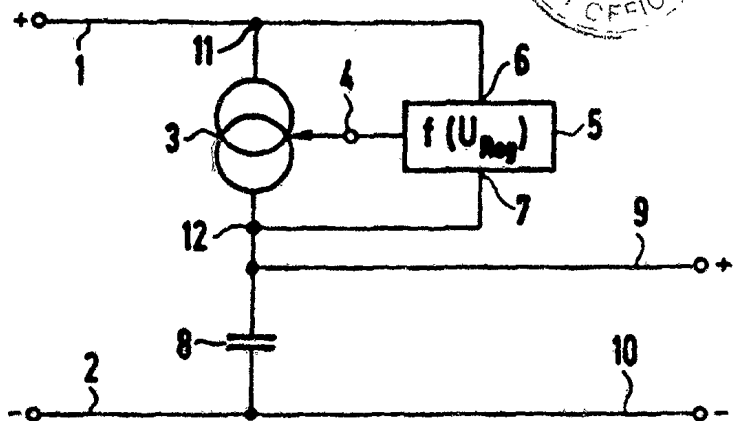
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(54) Title: COILLESS BUS COUPLER FOR AN ON-BOARD POWER SUPPLY

(54) Bezeichnung: SPULENLOSER BUSANKOPPLER FÜR BORDNETZVERSORGUNG

(57) Abstract

A device for establishing the on-board power supply in a bus coupler without a repeater for coupling to an information and power conducting bus (bus driver 1, 2) of a bus system, especially in the building management. The control input (4) of a coupling circuit (3) is connected to a triggering circuit (5) having inputs (6, 7) for a control criterion. The coupling circuit (3) is constructed and designed in such a way that it operates as a constant current source for communication frequencies and as a control circuit together with a triggering circuit (5) for lower frequencies, like those caused by power consumption. The coupling circuit (3) is connected depending on the effect in series with a storage capacitor (8) to tap the on-board system voltage. The series circuit is, according to the effect, connected to the bus drivers (1, 2).



(57) Zusammenfassung

Einrichtung zum Bereitstellen der Bordnetzspannung bei einem Busankoppler ohne Übertrager, zum Ankoppeln an einem Information und Energie führenden Bus (Busleiter 1, 2) eines Bussytems, insbesondere der Gebäudesystemtechnik. Eine Ankoppelschaltung (3) ist mit ihrem Steuereingang (4) mit einer Ansteuerschaltung (5) verbunden, die Eingänge (6, 7) für ein Regelkriterium aufweist. Die Ankoppelschaltung (3) ist derart aufgebaut und dimensioniert, daß sie in der Arbeitsweise einer Konstantstromquelle für Frequenzen der Nachricht arbeitet und für niedrigere Frequenzen - wie sie durch Energieverbrauch verursacht werden - in Verbindung mit der Ansteuerschaltung (5) als Regelschaltung arbeitet. Die Ankoppelschaltung (3) ist der Wirkung nach mit einem Speicherkondensator (8) zum Abgreifen der Bordnetzspannung in Serie geschaltet. Die Serienschaltung ist der Wirkung nach an den Busleitern (1, 2) angeschlossen.

Description

Vehicle power supply for a bus coupler without a transformer

5 The invention relates to a device for providing the vehicle power supply voltage for a bus coupler without a transformer, for coupling to a bus, which carries information and power, of a bus system, in particular for building system technology.

10 In detail, reference is made to the precharacterizing clause of claim 1. Such a bus coupler has been disclosed in WO-A-9 308 652. The known bus coupler is based on the objective of reducing reflections on a line which is not terminated. The known bus coupler operates without a transformer.

15 There are bus systems in building system technology, for example the bus system of the European Installation Bus Association, EIBA, in which reflections on the open line are negligible because of their type of operation.

20 In the past, bus couplers have frequently been designed with transformers (EP-A-0 365 696, EP-A-0 379 902). The DC voltage of the vehicle power supply is in this case obtained from the bus using a transformer and a capacitor, which act as an LC filter. If the inductance
25 of the transformer is associated with a low resistance, a low impedance is provided for obtaining direct current and a high inductive impedance is provided for the AC load resulting from the information transmission. In the case of such designs, limits are set on miniaturization
30 and integration into integrated circuits.

The invention is based on the object of providing a device for providing [sic] the vehicle power supply voltage for a bus coupler without a transformer, for coupling to



a bus carrying information and power, in which it is irrelevant whether measures to reduce the reflection are or are not necessary.

5 The indicated object according to the invention is achieved by means of a device according to patent claim 1. In this case, a coupling circuit is assumed having a control input, which coupling circuit is connected via the control input to a drive circuit, the drive circuit having inputs for a control criterion. The
10 coupling circuit is constructed and designed in such a manner that it operates in the manner of a constant current source for the information frequencies and operates as a control circuit, in conjunction with the drive circuit, for lower frequencies. Such relatively low
15 frequencies are caused by power consumption. The information frequencies may be regarded as transmission rate in bit/seconds [sic]. Thus, for example, the bus of the European Installation Bus Association, EIB Bus, operates, for example, at 9.6 kbit per second, which
20 corresponds to a frequency of 9.6 Khz. The coupling circuit is operatively connected in series with an energy storage capacitor for picking off the vehicle power supply voltage. The series circuit is operatively connected to the bus conductors.

25 The fact that the highest control frequency is lower than the lowest transmission frequency ensures that the impedance of the coupling circuit is sufficiently low for the vehicle power supply and sufficiently high for the information signals. The information on the bus is
30 thus not attenuated by the vehicle power supply. On the other hand, the power for the vehicle power supply is obtained in a particularly economic manner with low losses. In practice, it is advantageous to make the highest control frequency lower than one tenth of the
35 lowest transmission frequency.



Such a design enables embodiment in an integrated circuit, that is to say in an IC.

The coupling circuit may operatively have a transistor whose emitter forms, via a resistor, one pole
5 of the coupling circuit, to which pole a capacitor is also connected which is connected on its other side to the base, which is used as the control input, of the transistor, whose collector forms the other pole of the coupling circuit. Such a design is particularly simple
10 and effective.

The drive circuit is advantageously connected by its inputs to the two poles of the coupling circuit and is wired up and constructed in such a manner that the voltage drop of the



coupling circuit is a minimum. In this way, control is achieved with a minimum voltage drop on the coupling circuit and, in consequence, a very high efficiency is achieved.

5 The drive circuit can be optimized from a different point of view. If it is desired to control at a constant vehicle power supply voltage rather than for the best efficiency, a drive circuit according to claim 4 is advantageous. In this case, the inputs of the drive
10 circuit are connected to the energy storage capacitor and the drive circuit is wired up and constructed in such a manner that the voltage which can be picked off on the energy storage capacitor as the vehicle power supply voltage is kept constant.

15 On the other hand the drive circuit can be designed as claimed in claim 5 to control for the minimum current consumption from the bus system, and thus for the lowest power consumption of the bus system. According to
20 this claim, the drive circuit is connected by its inputs in the current path for the vehicle power supply. It is wired up and constructed in such a manner that the coupling circuit draws a current from the bus which is only in the order of magnitude which is in each case required for the vehicle power supply.

25 With a development as claimed in claim 6, it is possible to obtain the vehicle power supply voltage in the order of magnitude of the mean bus voltage, that is to say greater than the lowest bus voltage. If one imagines
30 that information is superimposed as an AC voltage on a DC potential in the case of a bus carrying power and information, then the lowest bus voltage falls to the extent of the information elements which are negative with respect to the DC potential. A bypass circuit according
35 to claim 6 makes it possible in the operating phase of the constant current source for a current to flow via the bypass even in the case of an vehicle power supply voltage which is greater than the bus voltage at certain times during operation, so that the constant current source can continue to operate correctly.



In the case of a device as claimed in claim 6, a bypass circuit is provided in series with the coupling circuit and bridging the energy storage capacitor, an active device, which switches off as a function of direction, being connected in the bridged path in series with the energy storage capacitor. This active device is connected in such a manner that the active device which switches off as a function of direction is in each case in its switched-off state when the voltage on the energy storage capacitor is higher than the voltage on the bypass circuit. An active device which switches off as a function of direction in this case means a device which is switched off in one direction and is switched on in the other direction. Such an active device may switch off automatically as a function of direction, may be controlled, or may also be a controlled active device.

The active device which switches off as a function of direction as claimed in claim 6 is in each case in its switched-on state when the voltage on the energy storage capacitor is lower than the voltage on the bypass circuit. The bypass is in this case wired up and constructed in such a manner that it is in each case switched off when the bus voltage is higher than the vehicle power supply voltage which can be picked off on the storage capacitor, and is switched on when the bus voltage is lower than the vehicle power supply voltage which can be picked off on the energy storage capacitor. Correct operation in the constant current source operating phase is thus achieved by an active device which switches off as a function of direction and by a bypass circuit, even when the vehicle power supply voltage is obtained in that order of magnitude of the mean bus voltage, which is higher than the lowest bus voltage.

The bypass circuit can be designed in a manner known per se with a comparator. Such a comparator can be rendered superfluous in a particularly simple and economic manner by means of a bypass circuit as claimed in claim 7. Such a bypass circuit has a transistor whose base is connected to the control line which exists



between the drive circuit and the coupling circuit. In this case,



an element which forms a voltage drop, in particular a diode in the forward direction, is connected between the base of the transistor of the coupling circuit and the base of the transistor of the bypass. DC transformation is in this case replaced by the voltage drop, caused by the current flow, across the element which forms the voltage drop.

A comparator in the bypass circuit is also rendered superfluous in a device according to the development as claimed in claim 8. In this case, the transistor of the coupling circuit has a sensing collector (DE-A-4 316 608) which is connected by its control electrode or base to a transistor of a complementary type which forms the bypass circuit. In this case, a comparator is rendered superfluous in a particularly favorable manner, silicone being saved in the event of integration in a chip.

It is now intended to explain the invention in more detail with reference to exemplary embodiments which are reproduced roughly and schematically in the drawing, in which:

FIG 1 illustrates schematically a device for providing the vehicle power supply voltage, in the case of which the control criterion in control operation is the voltage drop across the constant current source. In this case, control is effected for the minimum voltage drop across the coupling circuit, in order to achieve the greatest possible efficiency.

FIG 2 illustrates a device in which control is effected for a constant vehicle power supply voltage or operating voltage of the bus coupler in control operation.

FIG 3 illustrates a device in which control is effected for minimum current consumption and thus power consumption from the bus system in control operation.

FIG 4 illustrates a device which operates as a combination of a device according to FIG 2 and of a device according to FIG 3. The control criterion in this case is the vehicle power supply power or operating power.



FIG 5 illustrates an exemplary embodiment of a coupling circuit according to FIGs 1 to 4.

FIG 6 illustrates an exemplary embodiment of a drive circuit for the device according to FIG 1 or according to
5 FIG 2.

FIG 7 illustrates a development with a bypass for the device according to FIG 1.

FIG 8 illustrates a constant current source with a bypass, and a drive for it.

10 FIG 9 illustrates a development for the device according to FIG 2 and with a bypass, using a particularly favorable exemplary embodiment.

FIG 10 illustrates a development for the device according to FIG 2 and with a bypass provided, using a
15 further particularly advantageous exemplary embodiment.

The device for providing the vehicle power supply voltage for a bus coupler without a transformer, according to FIG 1, is connected to a bus having the bus conductors 1, 2. By way of example, the upper bus carries
20 positive potential and the lower bus negative potential or ground. The device has a coupling circuit 3 which is connected by its control input 4 to a drive circuit 5. The drive circuit 5 has inputs 6, 7 for a control criterion. The coupling circuit 3 is constructed and
25 designed in such a manner that it can be operated in the manner of a constant current source at the information frequencies. The information frequencies are transmitted as superimposed AC signals on a DC bus potential. The coupling circuit 3 operates as a control circuit, in
30 conjunction with the drive circuit 5, for low frequencies. The coupling circuit 3 is at least operatively connected to an energy storage capacitor 8 on which the vehicle power supply voltage can be picked off as a DC voltage on the supply rails 9 and 10. The series
35 circuit formed by the coupling circuit 3 and the energy storage capacitor 8 is operatively connected to the bus conductors 1 and 2. The vehicle power supply voltage



can be supplied to a bus coupler via the supply rails 9 and 10. The device for providing the vehicle power supply voltage may be part of the bus coupler. The power for the vehicle power supply is obtained in a particularly economic manner, with low losses.

The coupling circuit can be designed particularly simply and effectively according to FIG 5. According to this, the coupling circuit at least operatively has a transistor 13 whose emitter forms, via a resistor 14, one pole 11 of the coupling circuit. Also connected to the pole 11 is a capacitor 15, which is connected on its other side to the base, which is used as the control input, of the transistor 13. The collector of the transistor 13 forms the other pole 12 of the coupling circuit. At high currents, the impedance 14 can become so small that even the internal emitter impedance of the transistor is sufficient, and an additional external impedance is therefore rendered superfluous, that is to say it can be saved.

The drive circuit 5, which is connected to both poles 11, 12 of the coupling circuit 3, can in principle be designed according to FIG 6. The inputs 6, 7 of the drive circuit for a control criterion lead to a comparator 16, whose output is connected to the base of a transistor of the drive circuit. By way of example, the collector forms the output, which acts on the control input of the coupling circuit. The emitter is connected, for example, to reference ground.

The time constant of the coupling circuit 3 according to FIG 5 is given by the product of the gain B of the transistor 13, the impedance 14 and the capacitance of the capacitor 15 as $\text{Thau} = B \times R \times C$. At high frequencies, which information has, the coupling circuit acts as a constant current source with the time constant Thau.



The other pole 12 of the coupling circuit forms the output of the constant current source. And the pole 11 the input [sic].

5 In the case of a design according to FIG 2, in which the vehicle power supply voltage or operating voltage on the energy storage capacitor 8 is the control criterion, the coupling circuit 3 and the drive circuit 5 can be constructed in accordance with the exemplary embodiments according to FIG 5 and FIG 6.

10 The coupling circuit 3 and a drive circuit 5 can be designed, as is illustrated in FIGS 5 and 6, in accordance with the indicated principles using a design according to FIG 3, in which the vehicle power supply current or operating current is the control criterion. In
15 this case, the inputs 6 and 7 of the drive circuit may be applied across a measurement resistor 18, the vehicle power supply current being converted by the measurement resistor 18 into an input voltage for the drive circuit.

A design according to FIG 4 may be regarded as a
20 combination of the principles according to FIG 2 and FIG 3.

A device according to FIG 1, a bypass circuit 19 and an active device 20 which switches off as a function of direction is provided in the illustrated manner in the
25 case of the device according to FIG 7 [sic]. It is evident that certain components according to the exemplary embodiments may also be implemented only operatively in an integrated circuit. It is evident that all the circuits according to the illustrated figures may be
30 understood as such.

The bypass circuit 19 is provided, bridging the energy storage capacitor 8, in series with the coupling circuit 3. In this case, an active device 20 which switches off as a function of direction is connected in
35 the bridged path in series with the energy storage capacitor 8 in such a manner that this active device 20 is connected in such a manner which switches off as a function of direction is in each case in its switched-off state when the voltage on the energy storage capacitor 8



is higher than the voltage on the bypass circuit 19. On the other hand, the active device 20



which switches off as a function of direction is in its switched-on state when the voltage on the energy storage capacitor 8 is lower than the voltage on the bypass circuit 19. The bypass circuit 19 is wired up and designed in such a manner that it is in each case switched off when a bus voltage between the bus conductors 1, 2 is higher than the vehicle power supply voltage which can be picked off on the energy storage capacitor 8. The bypass circuit is switched on when a bus voltage is less than the vehicle power supply voltage which can be picked off on the energy storage capacitor 8. The coupling circuit 3, which is operated as a constant current source in this case, can then carry the current via the bypass circuit and maintain its function as a constant current source.

The active device which switches off as a function of direction may be designed to switch itself off as a function of direction, as a controlled active device or as a regulated active device.

During the time when the coupling circuit 3 is operating as a constant current source, the current in the case of a circuit according to FIG 7 is thus passed as a charging current via the active device 20 which switches off as a function of direction to the energy storage capacitor 8 when the bus voltage is higher than the voltage on the energy storage capacitor. When the bus voltage falls below the value of the voltage on the energy storage capacitor 8 as a result of the superimposed information, the energy storage capacitor is prevented from discharging via the directionally dependent active device 20, and the current of the constant current source is passed via the bypass circuit 19. During the other periods of operation, the coupling circuit 3 once again acts as a control circuit, in conjunction with the drive circuit 5. In the exemplary embodiment, the control criterion is the voltage drop on the constant current source, which is controlled for a minimum voltage drop. If the indicated circuits are provided with a bypass circuit, a higher vehicle power



supply voltage can thus be taken from the bus system than without a bypass circuit. On the other hand, a higher vehicle power supply voltage has the generally known advantages.



The arrangement according to FIG 8 and provided with the bypass circuit 19 is driven by a comparator 21. The circuit according to FIG 8 may be imagined as being supplemented by a drive circuit 5 according to one of
5 FIGS 1 to 3 and, for example, in each case according to FIG 6. The circuit according to FIG 9 illustrates a circuit principle which provides a circuit according to FIG 2 with a bypass function and is particularly suitable for integration in an integrated circuit. In this case,
10 a comparator 21 according to FIG 8 for driving the bypass function is rendered superfluous. The bypass circuit is designed as a bypass 24, which has a transistor 22 whose base is connected to the control line 23 which exists between the drive circuit 5' and the coupling circuit 3.
15 In this case, an element 25 which forms a voltage drop, in particular a diode in the forward direction, is connected between the base of the transistor 13 of the coupling circuit 3 and the base of the transistor 22 of the bypass 24. The voltage drop on the element 25 which
20 forms the voltage drop ensures that the current of the coupling circuit 3 charges the energy storage capacitor 8 as a constant current source in the operating phase as long as the voltage on the energy storage capacitor 8, and thus the vehicle power supply voltage on the supply
25 rails 9 and 10, is less than the voltage between the bus conductors 1 and 2. For operating states in which the voltage on the energy storage capacitor 8 is higher than that between the bus conductors 1 and 2, the voltage on the element 25 which forms a voltage drop ensures that
30 the capacitor 22 [sic] of the bypass 24 is switched on, and thus that a constant current can also continue to flow.

A resistor 26 and an inverting amplifier 27 are connected in series in the drive circuit 5' to the base
35 of the transistor 17, the input of the inverting amplifier 27 being connected between two voltage-dividing resistors 28 between the supply rails 9 and 10. When the vehicle power supply voltage between the supply rails 9 and 10 becomes smaller, the input of the inverting



amplifier 27 in the exemplary embodiment assumes a



more negative potential, so that an amplified positive voltage is present at its output, this positive voltage being present at the base of the transistor 17 as a positive potential and producing a smaller current flow via the collector and emitter, so that a more negative potential is present on the base of the transistor 13 of the coupling circuit which, in the case of a PNP transistor, leads to said transistor carrying a higher current via its emitter and collector, which current charges the energy storage capacitor 8 so that a higher voltage is once again present between the supply rails 9 and 10. The operating phase of the constant current source corresponds to the method of operation already described above.

FIG 10 illustrates a development, the comparator 21 according to FIG 8 also being rendered superfluous. In comparison with the design according to FIG 9, this design also manages without an element 25 which forms a voltage drop, the transistor 22 being driven for the bypass function by a transistor 13', which is designed as a sensing collector, of the coupling circuit 3. The design of a transistor with a sensing connector has been disclosed in DE-A-4 316 608. Such a transistor has a further collector, the sensing collector, which recognises the start of saturation as a voltage difference being undershot. When the base of such a transistor is driven with a constant current, that is to say in the phase when the coupling circuit is operating as a constant current source here, a current flows from the emitter to the sensing collector and no current passes through the sensing collector as long as the transistor is not in the saturation zone. When the main collector of the transistor is saturated, the sensing collector receives excess holes, seen in physical terms. The transistor formed with the sensing collector is in saturation when the emitter-collector voltage is very low. The current flow in the sensing collector is thus an indication that there is a correspondingly low voltage difference between the collector and the emitter. In general, the effect of the



saturation state is that any further rise in the control current cannot cause the collector current to grow.



In the design according to FIG 10, the coupling circuit is formed from the elements comprising the capacitor 15, the impedance 14 and the transistor with a sensing collector 13'. The transistor 13' with the collector 28 is at the same time used to drive the transistor 22 for the bypass function. Once again, an active device 20 which switches off as a function of direction prevents the charge flowing out of the energy storage capacitor 8. In comparison with the circuit according to FIG 9, the functions of the element 25 which forms a voltage drop are taken over by the transistor 13' with the sensing collector 28. In other respects, the same components are given the same reference symbols as in the case of the device according to FIG 9. In the case of the circuit according to FIG 10, when the coupling circuit is operating as a constant current source and the voltage between the emitter and collector of the transistor 13' with the sensing collector collapses as a result of the bus voltage sinking in comparison with the vehicle power supply voltage between the supply rails 9, 10, current is drawn from the sensing collector because of the incipient saturation state of the sensing collector 28, and this current now switches the transistor 22' on for the bypass function, so that the condition for the operating state with a constant current source is ensured. The transistor 22' according to FIG 10 differs from the transistor 22 according to FIG 9 only by being doped as a pnp transistor or as an npn transistor, respectively.

The essential feature in each case is the smooth transition between an operating phase with a constant current source and an operating phase with a control circuit function. The constant current source is provided for high frequencies, as are represented by information, and the control circuit operating phase is provided for low frequencies, which occur as a result of current being drawn in the vehicle power supply. The essential feature is that circuits which are particularly favorable for integration in an integrated circuit can be implemented using the principle according to the invention. The



illustrated discrete components can be designed only operatively or on the basis of their function in a manner known per se in the integrated circuit. The circuit connections can also, of course,



be implemented using integrated circuit technology. In particular, the circuits according to FIGs 9 and 10 can be designed in a particularly material-saving manner using an integrated circuit. Furthermore, the bipolar
5 transistors can be replaced by field-effect transistors.



Patent Claims

1. A device for providing the vehicle power supply voltage for a bus coupler without a transformer, for coupling to a bus (bus conductors 1, 2), which carries
5 information and power, of a bus system, in particular for building system technology, a coupling circuit (3) being connected via the control input (4) to a drive circuit (5) which has inputs (6, 7) for a control criterion, the coupling circuit (3) being constructed and designed in
10 such a manner that it operates in the manner of a constant current source for the information frequencies and operates as a control circuit, in conjunction with the drive circuit (5), for lower frequencies, the coupling circuit (3) being operatively connected in series with an
15 energy storage capacitor (8) for picking off the vehicle power supply voltage, and the series circuit being operatively connected to the bus conductors (1,2), characterized
in that
20 the coupling circuit (3) has a transistor (13) whose emitter forms, via a resistor (14), one pole (11) of the coupling circuit, to which pole (11) a capacitor (15) is also connected, which capacitor (15) is connected on its other side to the base, which is used as a control input
25 (4), of the transistor (13), whose collector forms the other pole (12) of the coupling circuit.
2. The device as claimed in claim 1, characterized
in that the drive circuit (5) is connected by its inputs
30 (6, 7) to the two poles (11, 12) of the coupling circuit (3) and is wired up and constructed in such a manner that the voltage drop on the coupling circuit is a minimum.



3. The device as claimed in claim 1,
characterized

in that the drive circuit (5, 5') is connected by its
inputs to the energy storage capacitor (8), and is wired
5 up and constructed in such a manner that the voltage
which can be picked off the energy storage capacitor (8)
as the vehicle power supply voltage is kept constant.

4. The device as claimed in claim 1 or one of claims
2 to 3, characterized

10 in that a bypass circuit (19, 24) is provided in series
with the coupling circuit (3) and bridging the energy
storage capacitor (8), an active device (20), which
switches off as a function of direction, being connected
in the bridged path in series with the energy storage
15 capacitor (8), in such a manner that the active device
(20) which switches off as a function of direction is in
each case in its switched-off state when the voltage on
the energy storage capacitor (8) is higher than the
voltage on the bypass circuit (19, 24), the active device
20 (20) which switches off as a function of direction in
each case being switched on when the voltage on the
energy storage capacitor (8) is lower than the voltage on
the bypass circuit (19, 24), the bypass circuit (19)
furthermore being wired up and constructed in such a
25 manner that it is in each case switched off when the bus
voltage is higher than the vehicle power supply voltage
which can be picked off the energy storage capacitor (8),
and is switched on when the bus voltage is lower than the
vehicle power supply voltage which can be picked off on
30 the energy storage capacitor (8).

5. The device as claimed in claims 1, 3, and 4,
characterized

in that the bypass circuit (19) is designed as a bypass
(24) which has a transistor (22) whose base is connected
35 to the control line (23) which exists between the drive
circuit (5') and the coupling circuit (3), an element
(25) which forms a voltage drop, in particular a diode in

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the forward direction, being connected between the base

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of the transistor (13) of the coupling circuit (3) and the base of the transistor (22) of the bypass (24).

6. The device as claimed in claims 1, 3, and 4, characterized

- 5 in that ^u~~the~~ transistor (13') of the coupling circuit (3) has a sensing collector (28) which is connected to the control input of a bypass circuit, the bypass circuit being formed, in particular, from a transistor (22') of a complementary type.



REPLACEMENT SHEET

Abstract

Vehicle power supply for a bus coupler without a transformer

A device for providing the vehicle power supply
5 voltage for a bus coupler without a transformer, for
coupling to a bus (bus conductors 1, 2), which carries
information and power, of a bus system, in particular for
building system technology. A coupling circuit (3) is
connected by its control input (4) to a drive circuit (5)
10 which has inputs (6, 7) for a control criterion. The
coupling circuit (3) is constructed and designed in such
a manner that it operates in the manner of a constant
current source for the information frequencies and
operates as a control circuit, in conjunction with the
15 drive circuit (5), for lower frequencies - such as those
caused by power consumption. The coupling circuit (3)
being operatively connected in series with an energy
storage capacitor (8) for picking off the vehicle power
supply voltage. The series circuit is operatively
20 connected to the bus conductors (1,2).

FIG 1



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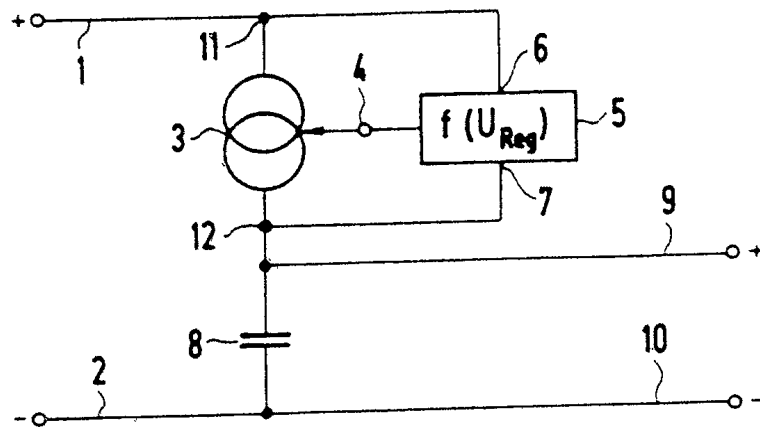


FIG 1

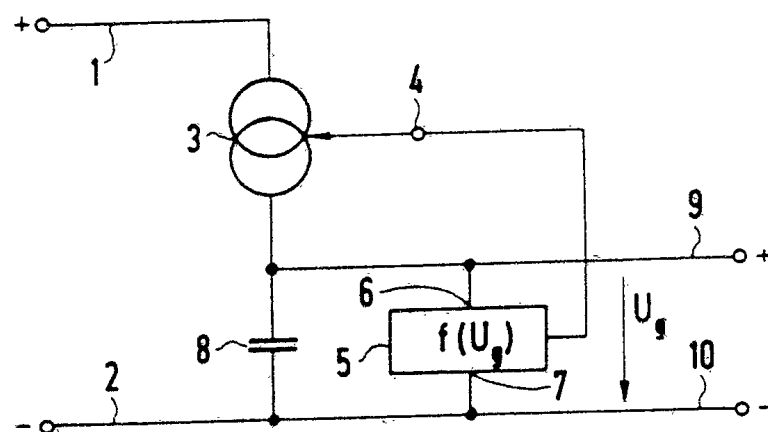


FIG 2

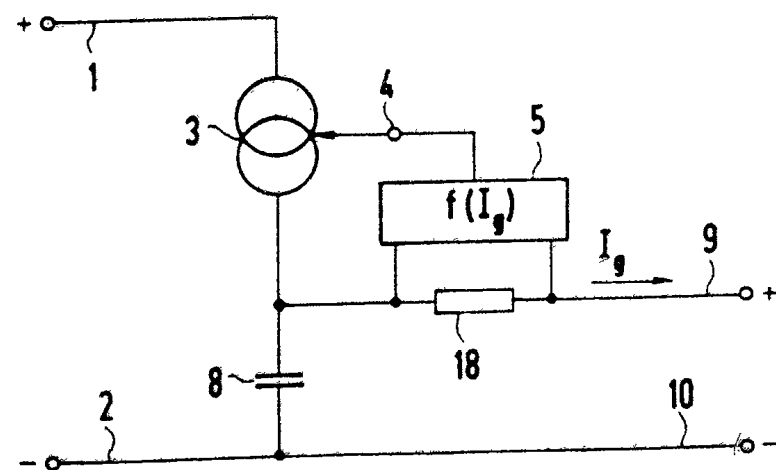


FIG 3

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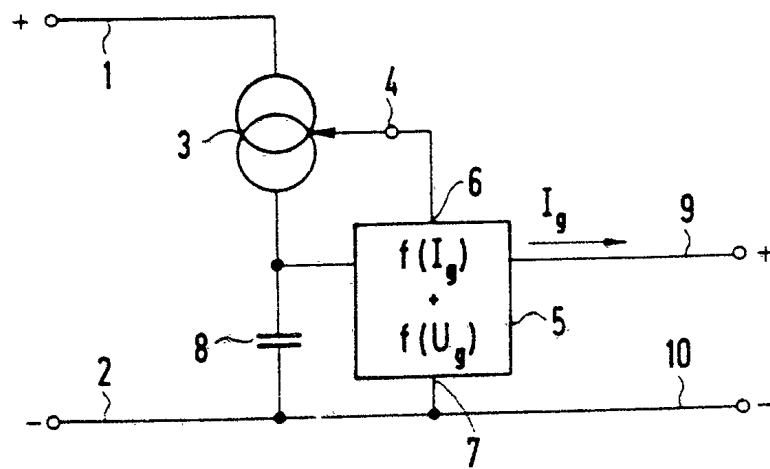


FIG 4

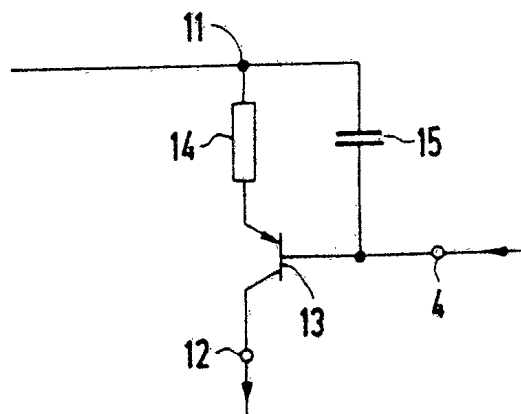


FIG 5

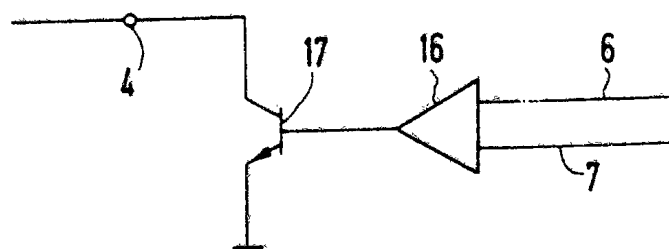


FIG 6

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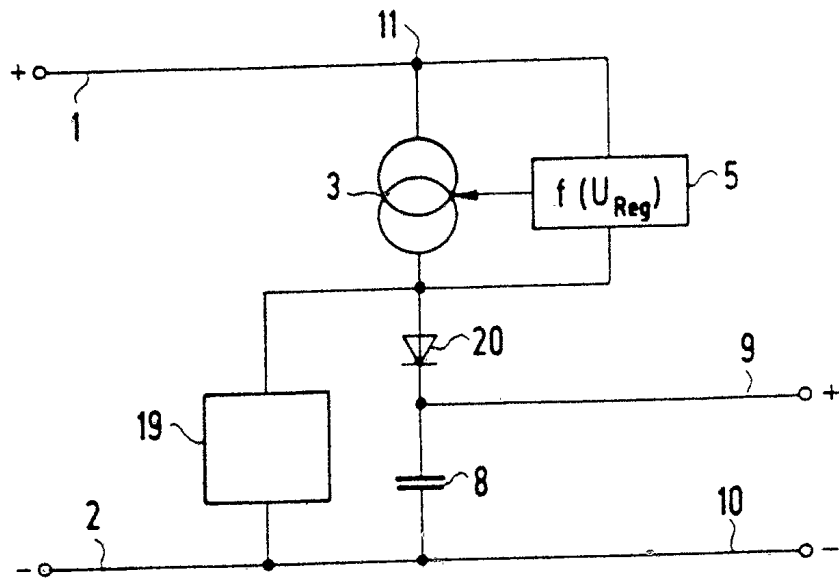


FIG 7

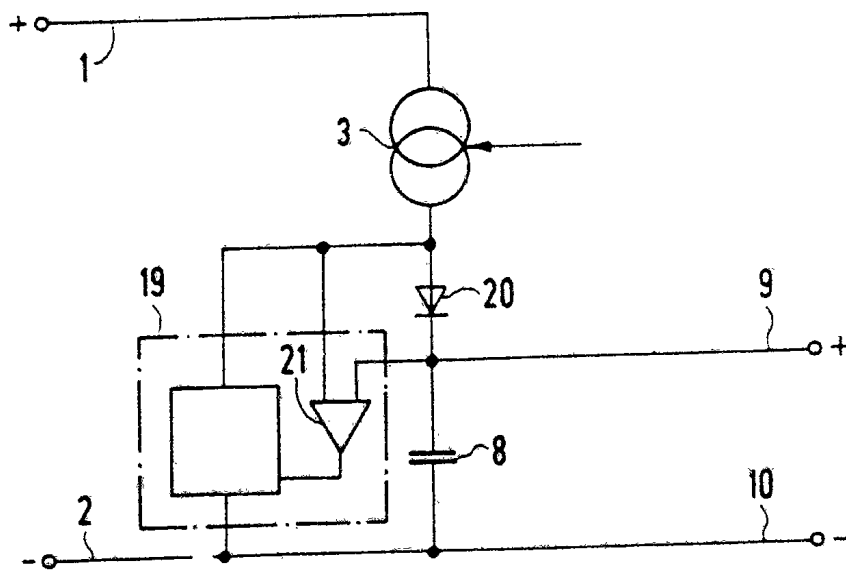


FIG 8

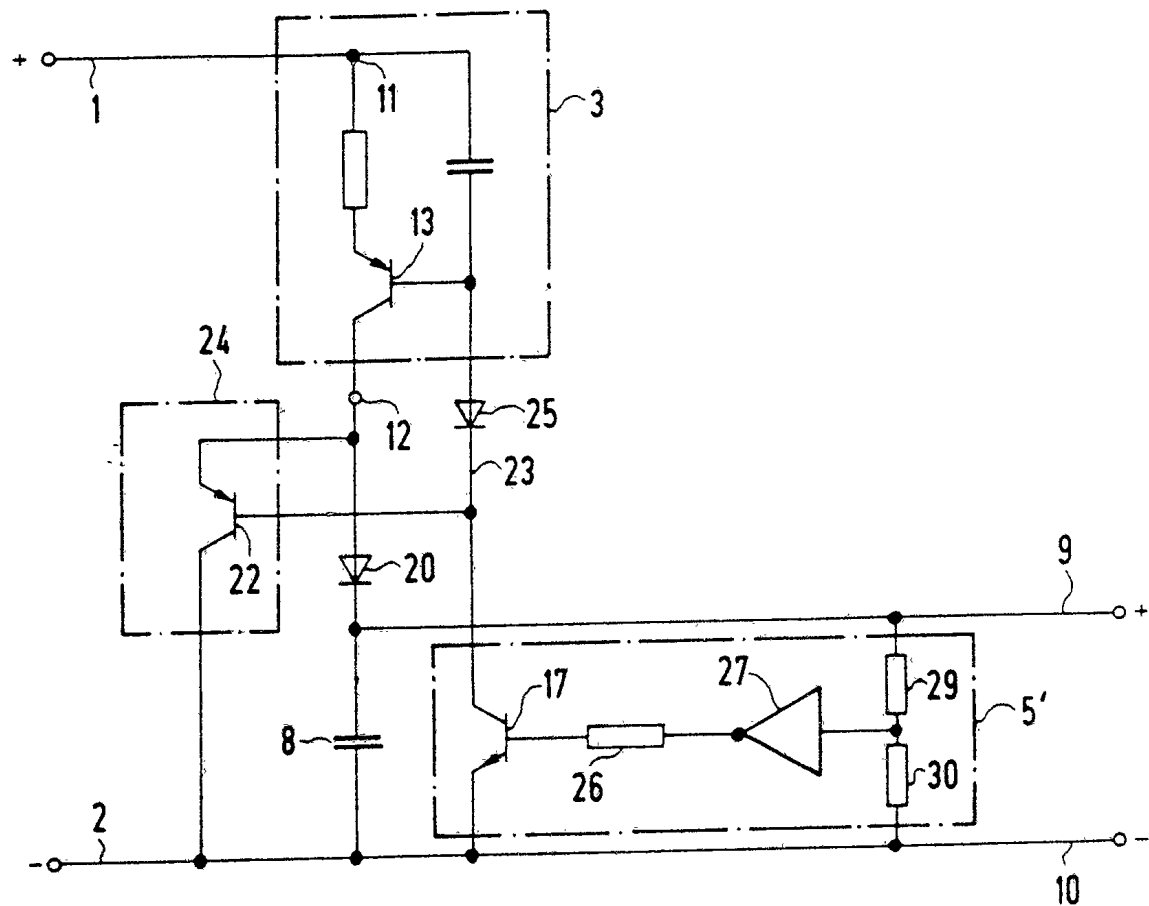


FIG 9

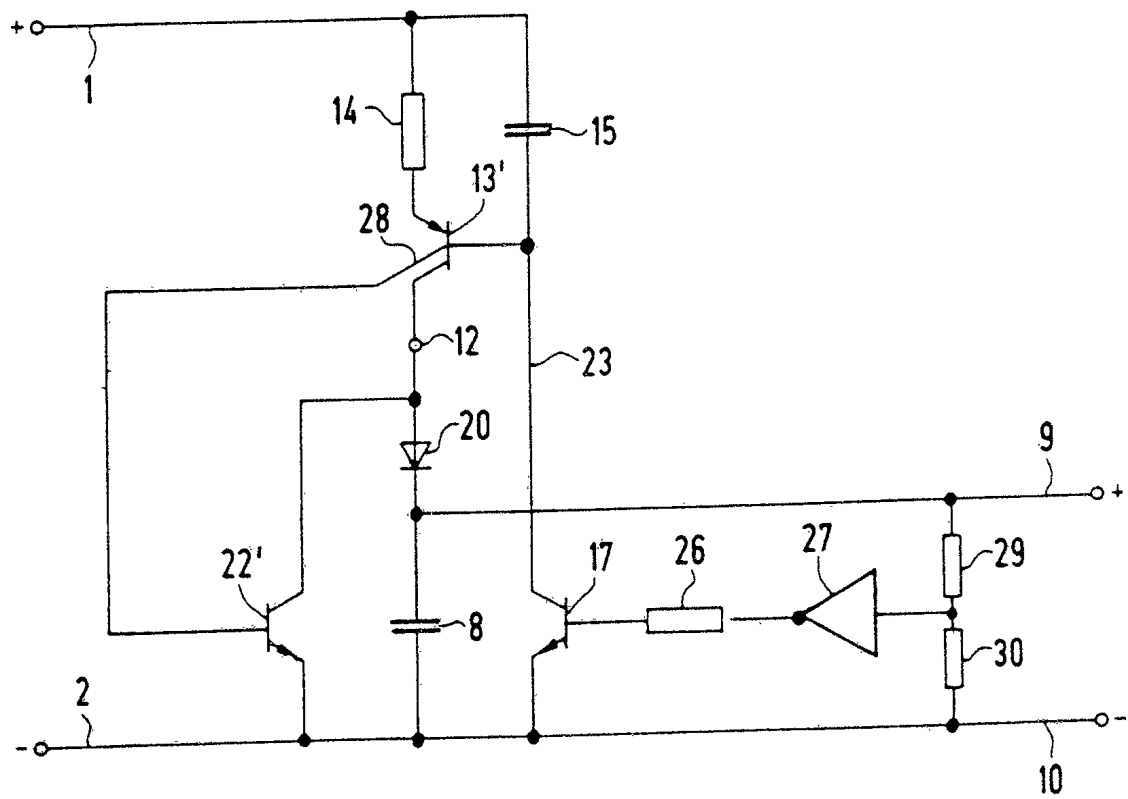


FIG 10