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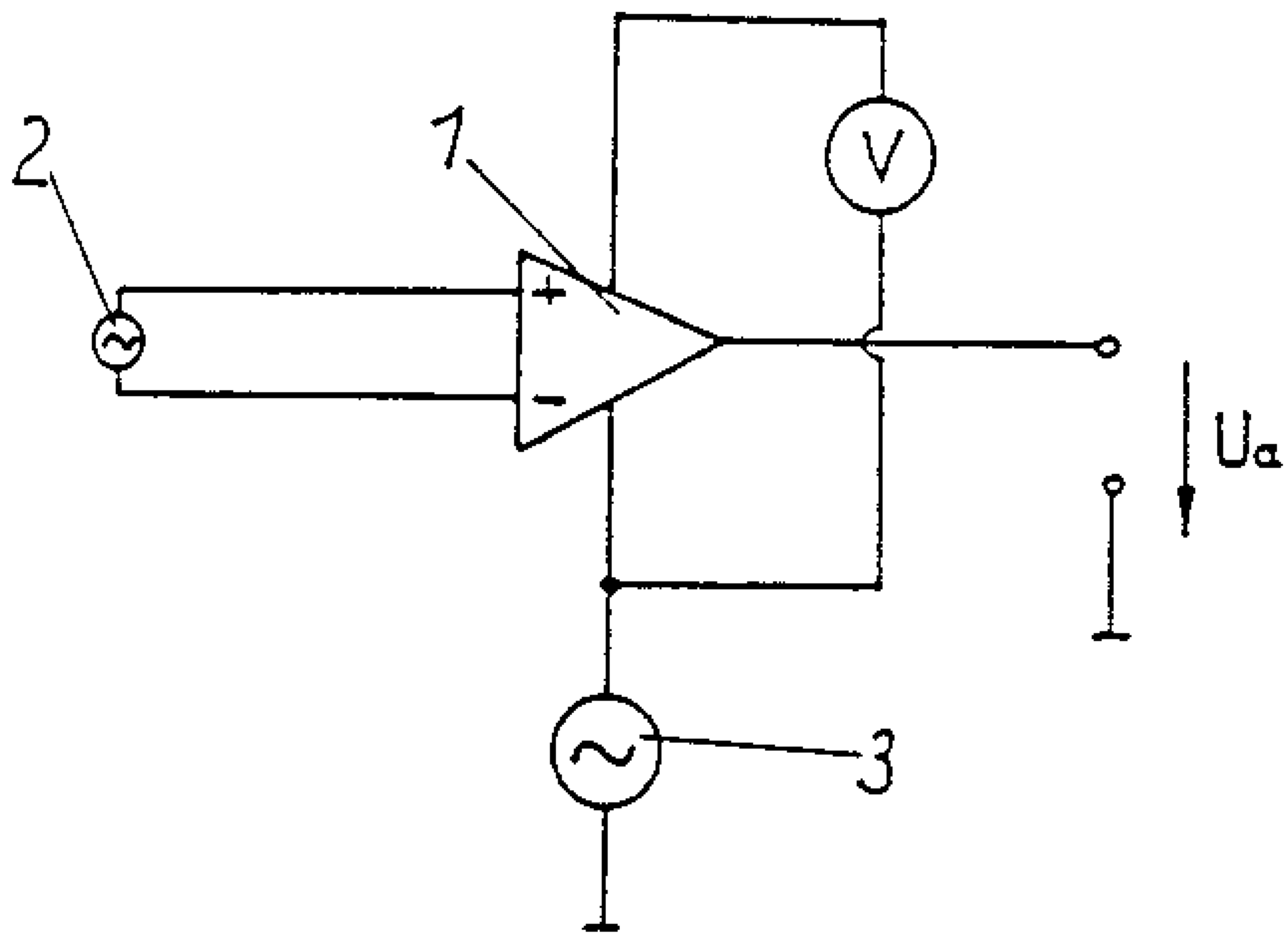

(57) Abrégé/Abstract:
A circuitry is disclosed for superimposing small, low energy (2) and large substantially higher energy (3) signals, in particular for transmitting speech signals with a remote supply direct signal for a receiving circuitry or with a high energy alternating signal, for example a call alternating voltage for signalling. In this circuitry is provided an operation amplifier (I). One pole of the source that supplies the small signal is connected to one input of said operation amplifier whose operational voltage inputs are connected to a voltage supply source. In order to allow low energy, weak signal, such as speech signals, and high energy signals and direct voltages to be transmitted by such circuitry over a subscriber line by means of simple components, the second pole of the small signal source (2) is linked to the second input of the operation amplifier (I) and one pole of a higher energy signal supply source (3) is linked to one pole of the voltage supply source (V).

(57) Abstract

A circuitry is disclosed for superimposing small, low energy (2) and large substantially higher energy (3) signals, in particular for transmitting speech signals with a remote supply direct signal for a receiving circuitry or with a high energy alternating signal, for example a call alternating voltage for signalling. In this circuitry is provided an operation amplifier (1). One pole of the source that supplies the small signal is connected to one input of said operation amplifier whose operational voltage inputs are connected to a voltage supply source. In order to allow low energy, weak signal, such as speech signals, and high energy signals and direct voltages to be transmitted by such circuitry over a subscriber line by means of simple components, the second pole of the small signal source (2) is linked to the second input of the operation amplifier (1) and one pole of a higher energy signal supply source (3) is linked to one pole of the voltage supply source (V).

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CIRCUITRY FOR TRANSMITTING SMALL, LOW-ENERGY SIGNALS AND LARGE, ESSENTIALLY HIGHER ENERGY SIGNALS

The present invention relates to circuitry for transmitting small, low-energy signals and large, essentially higher-energy signals, in particular for transmitting speech signals with a remote supply direct signal for a receiving circuit, or with a high-energy alternating signal, for example, a call alternating voltage for signalling, incorporated within which there is an operation amplifier the provides preset amplification, one pole of a source that supplies the small signal being connected to one input of said operation amplifier, the operational voltage inputs of this being connected to a voltage supply source.

At the present time, speech signals and supply voltages , for example, are superimposed mainly with the help of a transformer, a call alternating voltage in a telephone system being supplied to the subscriber lines by way of a relay. During this time, the source of the speech signal is completely cut off from the subscriber lines. Because of the fact that transformers and relays are relatively large and costly components, and because of the fact that relays, above all else, being mechanical components, are particularly vulnerable to wear, the use of such components entails corresponding disadvantages.

Attempts have been made to solve this problem by using the known SLIC (subscriber line interface circuit), in that the subscriber lines are controlled [?] by integrated amplifiers, when the output voltage range of these amplifiers has to encompass the total small- and large-signal control range of the subscriber line. This means that the circuits must be constructed using technology whose dielectric strength must match the largest signal that is encountered. This is typically 48V to 60V for the remote supply, and up to $180V_{pp}$ for the call alternating voltage, in contrast to which the speech alternating signal is in the range of 2 to $3V_{pp}$. However, when effected in this way, this of necessity results in a very high dissipation at the 180V operation amplifiers, and very large transistors have to be used because of the required dielectric strength, so that only a few functions can be integrated into a chip of acceptable size.

It is the object of the present invention to avoid these disadvantages and to propose circuitry of the type described in the introduction hereto, which makes it possible to transmit low-energy, weak signals, e.g., speech signals, and high-energy signals and DC voltages over a subscriber line in a simple manner, without having to use transformers and relays in order to do this, and which makes it possible to dispense with operation amplifiers having great dielectric strength.

According to the present invention, this has been effected in that the second pole of the source (2) that supplies the low-energy signals is connected to the second input of the operation amplifier (1), one pole of a source (3) that supplies the higher-energy signal is connected to one pole of the supply-voltage source (V), and the second pole of the source (3) that supplies the higher-energy signals is connected to the reference potential, the reduction of the output voltage (Va) being effected against this reference potential, the supply-voltage source (V) being independent of this reference potential.

By doing this it is, for example, possible to control one or both wires of a subscriber line in a telephone system from operation amplifiers, the control range and thus the supply voltage of which, which essentially determine the dissipation that occurs, are matched only to small signals, e.g, the speech signals, that appear, and which are so insulated from the remaining elements of the circuitry that their supply-voltage reference potential can be connected to a source of the high-energy signals.

The transmission of the speech signals onto the differential-voltage inputs of the insulated amplifier(s) can be effected by any method, for example, capacitatively, galvanically, or optically, either analog or digitally modulated, or unmodulated.

It has already been proposed that in order to enhance the voltage controllability of an operation amplifier, the supply voltage be related to the output voltage, the supply-voltage source being connected to the output of the operation amplifier.

According to another feature of the present invention, provision can be made such that one pole of the source that supplies the higher-energy signals be connected to an input of the operation amplifier, to which one pole of the supply-voltage source is also connected.

The foregoing measures result in a much simpler design for the circuitry according to the present invention.

Provision can also be made such that one pole of the source that supplies the higher-energy signals be connected to an operation-voltage input of the operation amplifier.

This results in the supply-voltage being superimposed with the higher-energy signals.

According to a further feature of the present invention, it can be proposed that the source that supplies the higher-energy signals be configured from a timed voltage converter, to the control input of which a control signal is applied.

This results in a high level of efficiency for the source for the higher-energy signals, without the need for a special structural form involving cooling bodies.

The present invention will be described in greater detail below on the basis of the drawings appended hereto. These drawings show the following:

Figure 1: A diagram showing a first embodiment of circuitry according to the present invention;
Figure 2: A diagram showing another embodiment of circuitry according to the present invention;
Figure 3: A diagram showing a source for generating a high-energy signal.

In the embodiment shown in Figure 1, a signal source 2 for generating small, low-energy signals is connected to the two signal inputs + and - of an operation amplifier 1 that provides pre-set amplification. In addition, one pole of a source 3 for supplying higher-energy signals is connected to the + signal input of the operation amplifier 1.

One pole of each of the two supply-voltage sources V1, V2 is also connected to this + input of the operation amplifier 1, whereby the supply voltage is related to the input of the operation amplifier 1.

The amplification provided by the operation amplifier 1 can be preset in that the output of the operation amplifier 1 is fed back through a resistor R2 to the inverting input "-", and the signal source 2 is connected to this output through a resistor R1.

The reduction of the output voltage U_a is effected against the reference potential of the source 3 that supplies the high energy signals.

In the embodiment that is shown in Figure 2, the source 2 of the low-energy signals is similarly connected to the inverting input and the non-inverting input of the operation amplifier 1. In this embodiment, however, the source 3 that supplies the higher-energy signals is connected to an operating voltage input of the operation amplifier 1, and a pole of a supply voltage source V is also connected to this input; the second pole is connected to the second operating voltage input of the operation amplifier.

In this embodiment, too, the reduction of the output voltage U_a is also effected against the reference potential of the source 3 for the high-energy signals.

One example of a source 3 for high-energy signals is shown in Figure 3.

In this embodiment, a signal source 4 that delivers weak signals controls a pulse-width modulator 5, the switches 6 and 7, which are normally configured a electronic switches, control a timed voltage converter 8. This voltage converter can be configured in any form. In the embodiment that is shown, the voltage converter 8 is formed from a series circuit of a choke 9 and a condenser

10, the reduction of the amplified signal voltage being effected at the point of connection of the choke 9 and the condenser 10, against a reference potential.

1. Circuitry for superimposing small, low energy signals from a first source (2) and large, essentially higher-energy signals from a second source (3), the first and second sources each having respective first and second poles, in particular for transmitting speech signals with a remote supply direct signal for a receiving circuit, or with a high-energy alternating signal, for example, a call alternating voltage for signalling, with the circuitry including an operation amplifier (1) having first and second inputs, having the first input connected to a first pole of the first source (2), and having supply voltage inputs connected to a voltage supply source (V), **characterised in that**, a second pole of the first source (2) is connected to the second input of the operation amplifier (1), and in that one pole of the second source (3) is connected to a pole of the voltage supply source (V), and the second pole of the second source (3) is connected to a reference potential, the reduction of the output voltage (Ua) being effected against this reference potential and the voltage supply source (V) being independent of this reference potential.

2. Circuitry according to claim 1, **characterised in that**, one of the poles of the second source (3) is connected to an input of the operation amplifier (1), to which one pole of the voltage supply source (V1, V2) is also connected.

3. Circuitry as defined in Claim 1, **characterised in that**, one of the poles of the second source (3) is connected to one of the poles of the supply voltage inputs of the operation amplifier (1).

4. Circuitry as defined in Claim 1 to Claim 3, **characterised in that,** the second source (3) is configured from a timed voltage converter (8), to a control input of which a control signal is applied.

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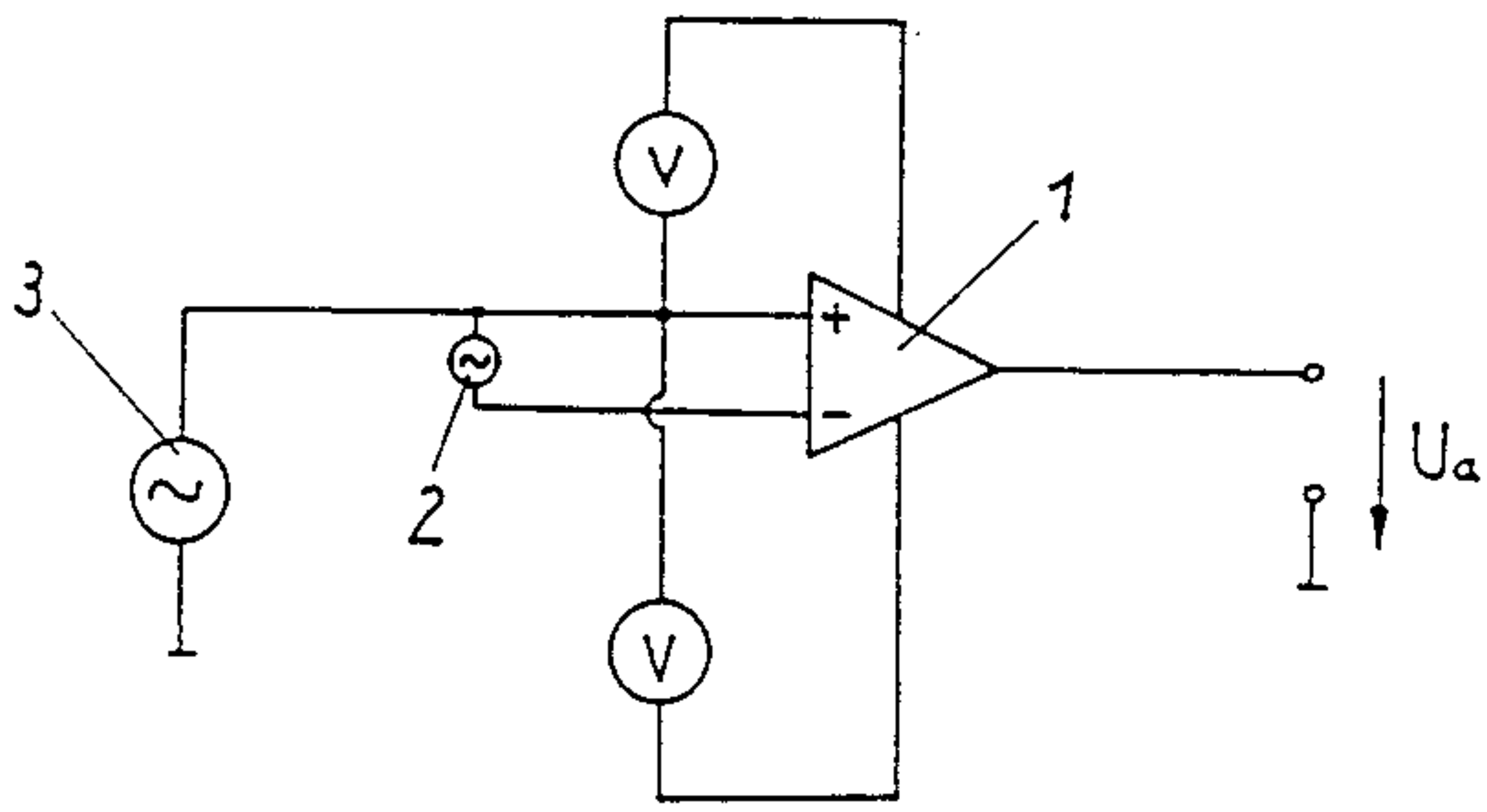

FIG.1

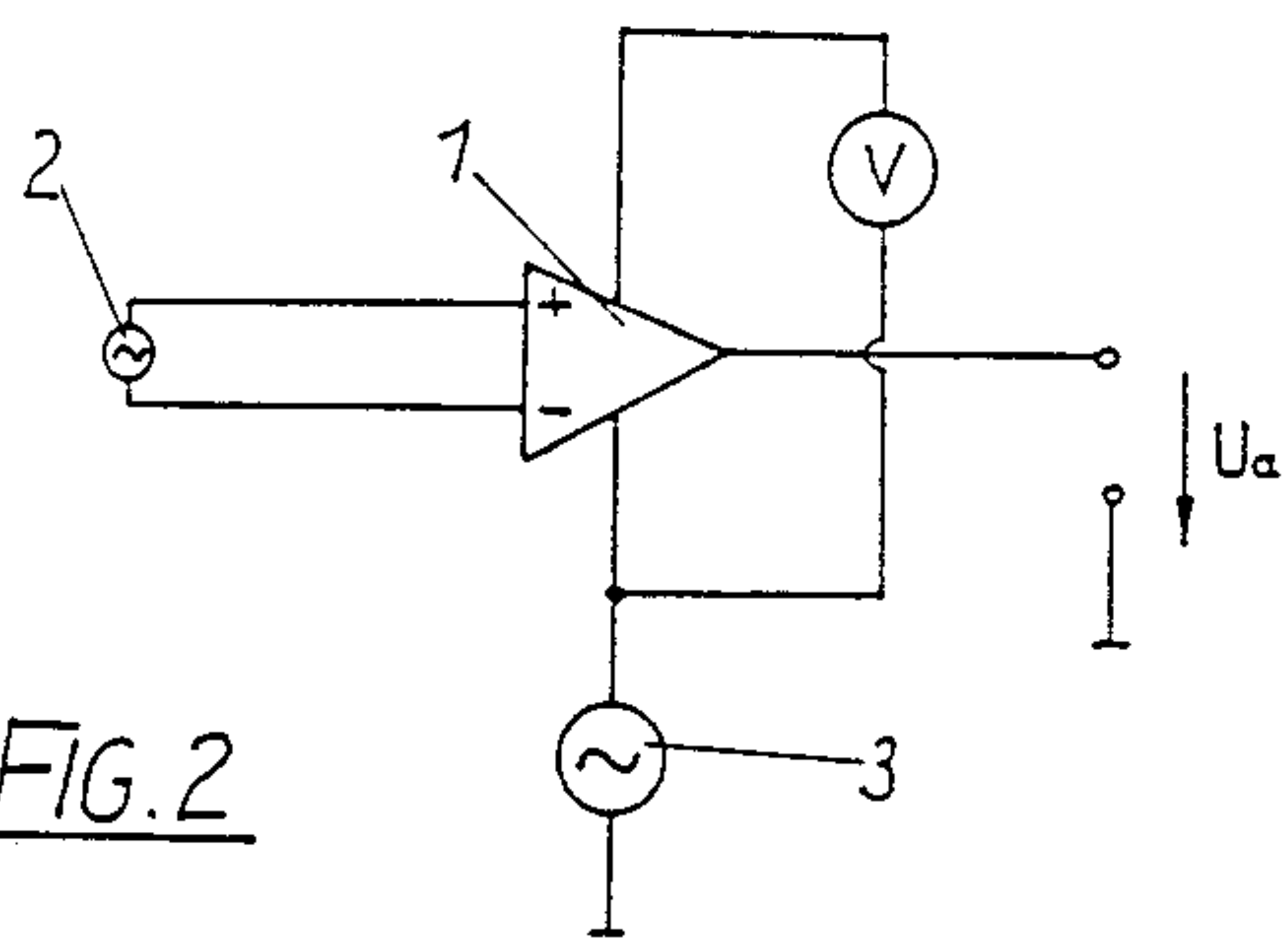

FIG.2

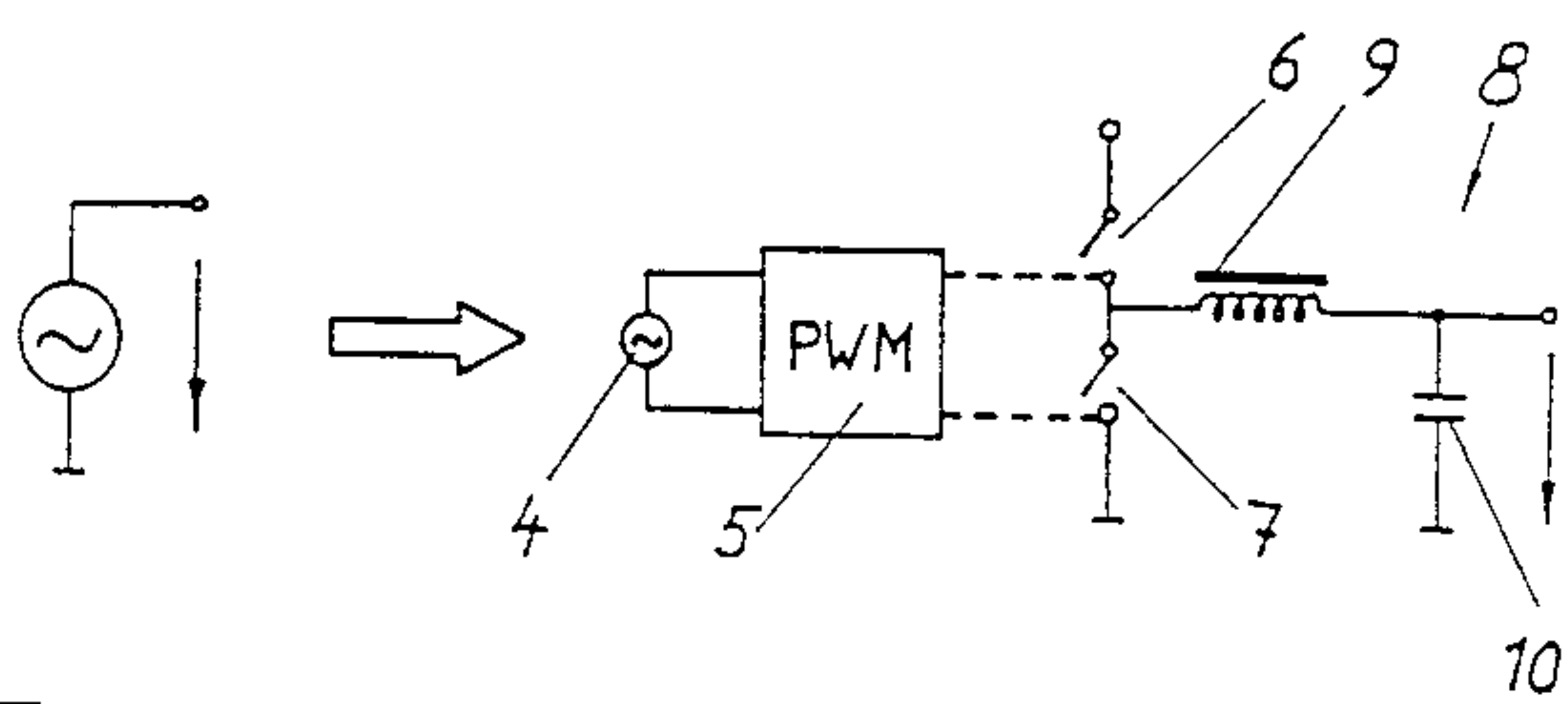

FIG.3

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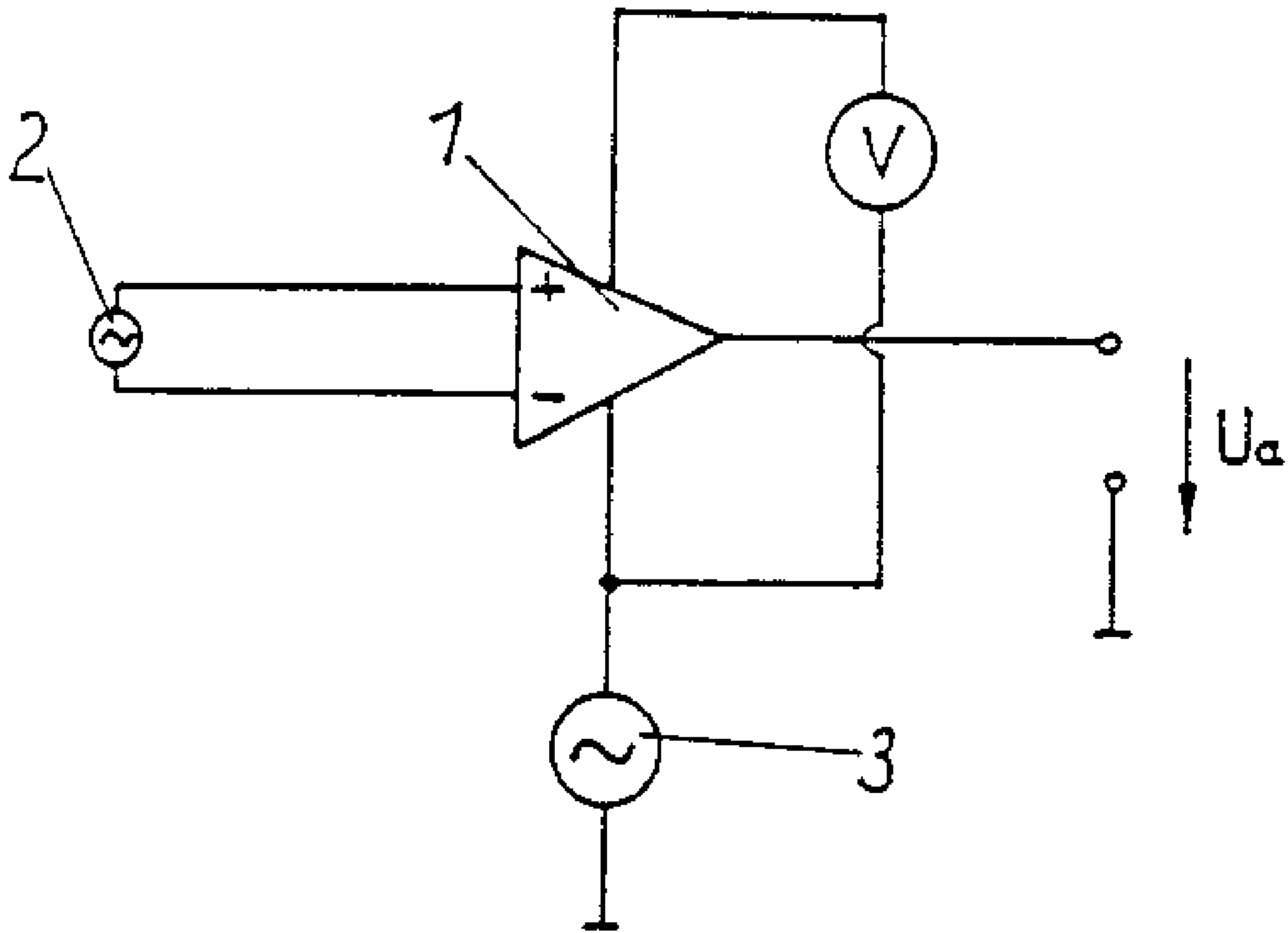
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