The invention relates to a further improvement in the device for oscillographing electrical or mechanical processes as described in patent specification No. 203,187, now U.S. Patent No. 2,178,471 issued October 31, 1939. In said device, variations of an impedance which is spatially separated from the point of indication, which variations correspond to these processes, modulate a high-frequency current generated by a high-frequency generator. Thus modulated oscillations influence an oscillograph or other indicator, preferably after amplification and/or detection thereof. With the device set out in the above-mentioned patent specification the variable impedance forms part, both electrically and mechanically, of a bridge which is arranged at the point where the processes take place and which may be connected by conductors of any length desired both to the high-frequency generator and to the indicator. This bridge may be brought into equilibrium by re-adjusting one of the four impedances of which it consists.

A device as referred to above is represented in Fig. 1 of the accompanying drawing, which corresponds to Fig. 1 of the said patent specification No. 203,187 and which therefore will not be described hereinafter anew in full details.

Two dotted rectangles 2 and 3 represent two devices arranged at the points where the processes to be watched take place, each of these devices consists substantially of a bridge-connection wherein the impedances varying with the processes are represented by condensers 28 and 34 respectively, said condensers being shown as variable condensers. The two bridges may be brought into equilibrium by re-adjusting two variable condensers 28 and 35 respectively.

This device has various drawbacks. Firstly, there is a risk of overloading the amplifiers 4 and 8 to which the measuring currents are supplied, since, in connection with the drift of the various values which is liable to occur in course of time, one is compelled to adjust the bridge rather far from its state of equilibrium so that there always flows a rather heavy high-frequency current. Secondly, it is necessary to compensate the drift of the electrical values of the bridge components. Furthermore, since it may be necessary to arrange the bridge at a badly accessible point, readjustment of the position of equilibrium is consequently difficult or impossible.

According to the invention, all these drawbacks may be obviated by effecting the re-adjustment not in the bridge itself but at any desired point of the conductor leading from the bridge to the indicator (or amplifier), namely by supplying to this point a voltage regulable in phase and in value.

At the start of each observation, irrespective of the state of equilibrium of the bridge, the indicator may now be adjusted to the desired starting point and this may be effected at the point most appropriate therefor, for example at the indicator. Fig. 2 of the accompanying drawing represents one practical example wherein only those parts which are essential for the proper understanding of the invention are copied from Fig. 1.

A high-frequency generator 1 supplies current not only through conductors 41 and 42 to a bridge 23-24-25-26 but also, by means of a winding 44 coupled with the winding 8, to a circuit consisting of a potentiometer 42 in series with a phase rotator 43 of any desired type.

By means of potentiometer 42 and the phase rotator 43 the amplitude and phase of the voltage across a winding 41 coupled with a secondary winding 60 included in the conductor 26, may be regulated. In this manner a voltage which has the frequency of generator 1 and which may be regulated in value and phase, is introduced in series with the conductor 26. With the aid of this auxiliary voltage it is consequently possible to adjust the zero-point of the indicator from any desired point, independently of the state of equilibrium of the bridge. The condenser 26 of this bridge need therefore not be variable, which is beneficial to the, often desired, solid construction of the apparatus 1.

What we claim is:

1. A device for oscillographing variable quantities occurring at a measuring point, comprising means for generating a high-frequency current, an A.C. bridge arrangement comprising a plurality of impedances, one of said impedances being variable in accordance with said quantities, means to connect one diagonal of said bridge to said generating means, an oscillograph, a conductor connecting said oscillograph to the other diagonal of said bridge, and means to compensate for unbalances of the impedances of said bridge, said latter means comprising a source of voltage having the same frequency as said high-frequency current, means to modify the phase and amplitude of said voltage and means to introduce the modified voltage into said conductor.

2. A device for oscillographing variable quantities occurring at a measuring point, comprising means for generating a high-frequency current, an A.C. bridge arrangement comprising a plurality of impedances, one of said impedances be-
ing variable in accordance with said quantities, means to connect one diagonal of said bridge to said generating means, an oscillograph, a conductor connecting said oscillograph to the other diagonal of said bridge, and means to compensate for unbalances of the impedances of said bridge, said latter means comprising a coupler member for deriving a high-frequency voltage from said generator, means to vary the phase and amplitude of said voltage and means to introduce the modified voltage into said conductor. 3. A device for oscillographing variable quantities occurring at a measuring point, comprising means disposed at some distance from the measuring point for generating high-frequency current, means disposed at the measuring point for modulating said current in accordance with the quantities to be measured and comprising an A. C. bridge arrangement having an impedance adapted to be varied in accordance with said quantities, a two-conductor cable of considerable length connecting one diagonal of said bridge to said generating means, means to tune said cable to the high-frequency oscillations to be transmitted, an oscillograph, demodulating means adapted to apply to the oscillograph a controlling voltage which varies in accordance with the quantities being measured, a conductor connecting the demodulator to the other diagonal of said bridge, means to derive a high-frequency voltage from said generator, means to vary the phase and amplitude of said voltage and means to apply the modified voltage to said demodulator in opposition to the voltage applied to the demodulator from the said diagonal of the bridge.

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