

IN THE UNITED STATES PATENT OFFICE

Applicant	: Lyman L. Blackwell	Examiner	: A.R. Borchelt
Serial No.	: 876,156	Paper No.	: 23
Filed	: December 4, 1969	Group	: 250
For	: Circuit for Detection of Small Resistance Changes in Ionization Chamber Devices	Denver, Colorado	October 27, 1971

Hon. Commissioner of Patents
Washington, D.C. 20231

Sir:

AMENDMENT UNDER RULE 116

This communication is intended to be responsive to the Office action dated January 15, 1971, and should be amended as follows:

In the Claims:

Rewrite claim 7 in independent amended form.

7. (Amended) [1.] An electronic circuit for detecting small percentage resistance changes in devices having high resistance, including: an electron vacuum tube having a cathode, anode and control grid; means responsive to a change of electrical current interconnected between the anode and cathode of
5 said vacuum tube as a load thereon; a grid bias resistor having one terminal thereof connected to the cathode wherein the cathode is biased positive with respect to the grid; a source of direct current electrical power having positive and negative polarity terminals, said negative terminal connected to the other terminal of the bias resistor; means interconnecting said vacuum tube anode and the positive polarity terminal of
10 said source; and, conductive means interconnected between the said control grid bias resistor, the electrical resistance of said conductive means being substantially equal to the effective internal plate resistance of the vacuum tube, said resistance of

Applicant : Lyman L. Blackwell

Serial No. : 876,156

-2-

the conductive means being of a value which permits some significant amount of grid current to flow at all times [2. The circuit of claim 1] wherein the current responsive means includes electrically actuated switch means having a pair of terminals [7. The circuit of claim 3] and further including positive feedback means interconnected between the control grid of the vacuum tube and that terminal of the switch means connected to the power supply which is most positive with respect to the cathode of the vacuum tube to drive the grid more positive producing positive feedback upon anode-cathode current increase.

Rewrite claim 10 in independent amended form.

10. (Amended) [9.] Apparatus responsive to change in resistance of a high resistance device, including: a vacuum tube having a cathode, control grid and anode, voltage means normally biasing the control grid almost to the point necessary for tube current cut-off to permit some significant amount of grid current to flow at all times; load means connected to the anode of said tube and including switching means responsive to a given level of load current; negative feedback means including a current path between said load and said voltage biasing means; and voltage supply means connected to said tube [elements] cathode, control grid and anode having a magnitude appropriate to cause the tube input resistance to substantially equal the resistance of [said conductor] the high resistance device while permitting some significant amount of grid current to flow at all times [10. The combination of claim 9] wherein said [conductor] high resistance device includes an ionization chamber having electrodes exposed to air and further including: a positive feedback means; a voltage source; a reference ionization chamber closed to exposure from the air, and having one electrode connected to the control grid of the tube and a second electrode connected to positive feedback means and a voltage source.

Applicant : Lyman L. Blackwell

Serial No. : 876,156

-3-

Cancel claims 1 - 6, 8, 9 and 12 without prejudice and add the following claim.

13. (Amended) Apparatus for detecting changes in a gaseous medium, comprising a low voltage power source connecting means for supplying a voltage of the order of about 20 volts; a pair of low voltage ionization chambers connected in series to the power source connecting means and constructed to operate
5 with a voltage of the order of about 6 volts and having a common output element to define a low voltage signal source responsive to the composition of the gaseous medium within said chambers; and a vacuum tube detection circuit connected to the power connection means and including vacuum tube amplifier means having a high
10 input impedance and input terminal means connected to said common output element and load terminal means connected in circuit to said power connection means and output connection means to produce an output signal in accordance with the signal at said common output element.

REMARKS

Claim 7 is rewritten in independent form and is believed to distinguish over the patent to Evans et al in that Evans makes no provision for the flow of grid current at all times and drives the grid more negative with a reduction in plate current. Further, as suggested by the Examiner, the claim is amended to more clearly define the positive feedback means. As such, claim 7, as amended, is believed to be in condition for allowance. Additionally, claim 10 is rewritten independent of claim 9, which is amended to overcome the structural deficiencies as suggested by the Examiner. Thus, claim 10 and dependent claim 11 are believed to be in condition for

Applicant : Lyman L. Blackwell
Serial No. : 876,156

-4-

allowance. Claim 13 is added to provide the scope of protection to which applicant is reasonably entitled. The most pertinent prior art is that of a patent to Klein, number 3,514,603, which is directed to a similar circuit but limited to a solid state detector and amplifier. The invention of claim 13 is not taught or suggested by Klein, and is believed to be allowable thereover. Allowance of all claims is in order and prompt action to this end is appreciated.

Respectfully submitted,

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