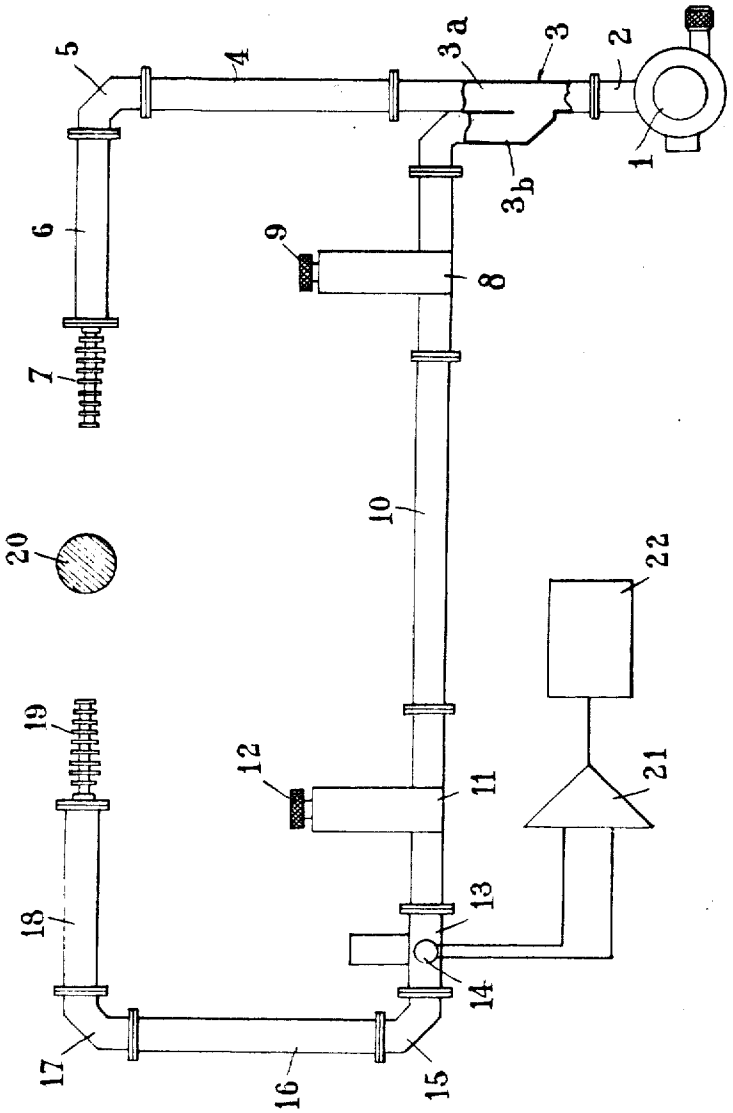
Feb. 4, 1969 R. LOYEN 3,426,247

PHOTOGRAPHIC SPARK GENERATOR HAVING A VERY HIGH FREQUENCY BRIDGE TRIGGER

Filed Feb. 11, 1965



United States Patent Office 3,426,247
Patented Feb. 4, 1969

3,426,247

PHOTOGRAPHIC SPARK GENERATOR HAVING A VERY HIGH FREQUENCY BRIDGE TRIGGER

Roger Loyen, Vernon, France, assignor to Etat Francais (French state) represented by the Minister of Armed Forces, Ministerial Delegation for Armament, Direction of Researches and Manufacture of Armament Laboratory of Ballistic and Aerodynamic Researches, Vernon, France

Filed Feb. 11, 1965, Ser. No. 431,806
U.S. Cl. 315—149 1 Claim
Int. Cl. H05b 37/02, 39/04

This invention relates to means for detecting the passage of a body moving at a very high speed and notably to devices of this character for detecting the passage of a projectile moving at a velocity of the order of several miles per second.

At such speeds the conventional photoelectric means are scarcely efficient for the ionisation of the surrounding air due to the collision or impact produced in front of the projectile develops a very luminous sheath around the projectile. This luminous sheath constitutes a light source of considerable intensity of which the brilliance is difficult to foresee since it is subordinate to the nature of the gas in which the projectile is moving, to the pressure and other factors.

It is the essential object of the present invention to provide a device for detecting the passage of a body moving at very high velocity, this device being characterized in that it comprises on either side of the path followed by the moving body a V.H.F. (very-high frequency) antenna and that these two V.H.F. antennas are connected to a V.H.F. bridge comprising a crystal detector emitting an output signal when a moving body occurs between said two V.H.F. antennas.

The V.H.F. detector according to this invention is adapted more particularly, by using adequate wavelengths, to energize a spark generator for taking translucent or non-translucent views of the projectiles, irrespective of their speed.

The wavelength to be used in the device of this invention depends on the projectile diameter and this wavelength should be lower or at the most equal to the projectile diameter to provide a satisfactory response signal.

A typical form of embodiment of this invention will now be described by way of example with reference to the single figure of the attached drawing illustrating a V.H.F. detector constructed according to the teachings of this invention.

The device according to this invention comprises a V.H.F. wave generator **1** for example of the klystron reflex type connected through an output waveguide **2** to a directional coupler **3**. One waveguide section **3***a* of this coupler **3** is connected through a rectilinear waveguide **4**, a 90° elbow waveguide **5** and a rectilinear waveguide **6**, to a first V.H.F. antenna **7**.

The other section **3***b* of said directional coupler **3** leads into a 90° elbow connected to a phase converter **8** adjustable by means of a knob **9**. This phase converter **8** is aligned with a rectilinear waveguide **10** having its other end connected to an attenuator **11** adjustable by means of a knob **12**. This attenuator **11** is connected to one arm of a magic T **13** carrying the crystal detector **14**.

The opposite arm of said magic T **13** is connected through a 90° elbow waveguide **15**, a rectilinear waveguide **16**, another 90° elbow waveguide **17** and a rectilinear waveguide **18** to another V.H.F. antenna **19** registering or aligned with the first V.H.F. antenna **7**. The two V.H.F. antennas **7** and **19** are disposed on either side of the path to be followed by the moving body **20** of which the passage is to be detected by the device.

From the foregoing is it clear that the detector of this invention comprises from the directional coupler **3** two main branches as follows:

(1) The antennas branch comprising the waveguides **4**, **5**, **6**, antennas **7** and **19**, waveguides **18**, **17**, **16** and **15**;

(2) The balance branch comprising the phase converter **8**, waveguide **10** and attenuator **11**.

These two branches are connected to the magic T **13** and the resulting assembly constitutes a closed electromagnetic circuit.

The directional coupler **3** transmits part of the power issuing from the glystron reflex **1** to the branch comprising the antennas **7** and **19**, and the remaining part of this power to the balance branch. The ratio of these two parts is subordinate to the attenuation produced between the antennas **7** and **19**.

Before operating the device of this invention (which constitutes what may be termed a "V.H.F. bridge") it is necessary to balance the two branches by means of the phase converter **8** and attenuator **11** by turning the adjustment knobs **9** and **12** until no signal is detected by the crystal **14**.

Upon completion of this adjustment, when a body **20** travelling at very high velocity, for example a projectile, is caused to pass between the two antennas **7** and **19**, the V.H.F. bridge becomes unbalanced and a signal is detected by the crystal **14**. This signal may be used either directly or subsequent to a suitable amplification according to requirements.

In the drawing the crystal **14** is known as being connected to an amplifier **21** having its output connected to a spark generator **22** controlling the photographing of the projectile **20** as it passes between the two antennas **7** and **19**.

The power output of the V.H.F. tube **1** is subordinate to the degree of attenuation produced between the antennas **7** and **19**.

Although the present invention has been described in conjunction with a preferred embodiment, it is to be understood that modifications and variations may be resorted to without departing from the spirit and scope of the invention, as those skilled in the art will readily understand. Such modifications and variations are considered to be within the purview and scope of the invention and appended claims.

What I claim is:

1. Device for detecting the passage of a projectile moving at a very high velocity and for photographing said projectile which comprises two very high frequency antennas namely a transmitting antenna and a receiving antenna disposed on opposite sides of the path of travel of said projectile, a very high frequency generator having an output with a wavelength not exceeding the diameter of said projectile, a directional coupler connected to the output of said very high frequency generator and having a first section and a second section, a magic T having a first arm and a second arm, a crystal detector carried by said magic T, and a closed electromagnetic circuit comprising a first branch and a second branch connected in parallel with one another between said directional coupler and said magic T, said first branch consisting essentially of said antennas, first wave guide means connecting said first section of said directional coupler to said transmitting antenna and second waveguide means connecting said receiving antenna to said first arm of said magic T to provide a first path of travel of electromagnetic waves from said first section of said directional coupler through said first waveguide means, said transmitting antenna, said receiving antenna and said second wave guide means to said first arm of said magic T, and said second branch consisting essentially of an adjustable phase converter, an adjustable attenuator and third wave guide means con-

necting said phase converter and attenuator in series between said second section of said directional coupler and said second arm of said magic T to provide a second path of travel of electromagnetic waves from said second section of said directional coupler through said phase converter and attenuator to said second arm of said magic T, an amplifier connected to said detector crystal and a spark generator connected to said amplifier for photographing said projectile when it is caused to pass between said antennas.

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JAMES W. LAWRENCE, *Primary Examiner.*

C. R. CAMPBELL, *Assistant Examiner.*

U.S. Cl. X.R.

315—173, 241; 329—58.5; 333—95; 340—258; 343—5; 346—107