April 14, 1970 D. N. FISTELL 3,506,919

MODULATED PORTABLE SIGNALING OR TEST TRANSMITTER

Filed July 21, 1967

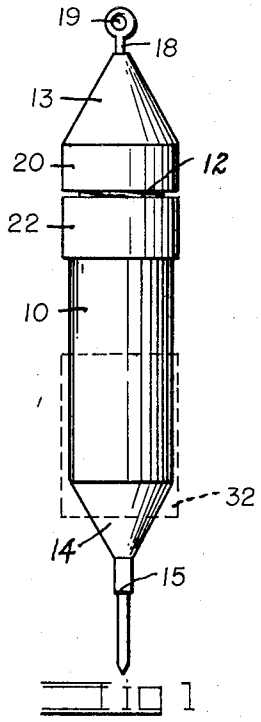


Fig. 1

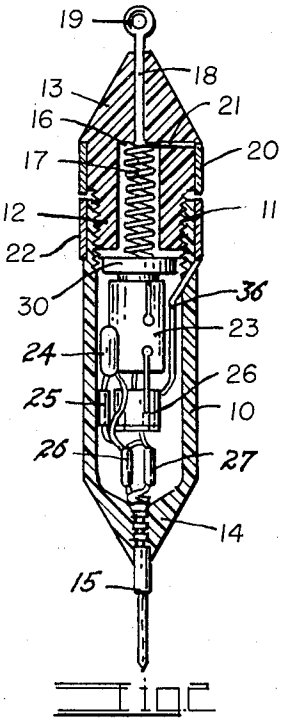


Fig. 2

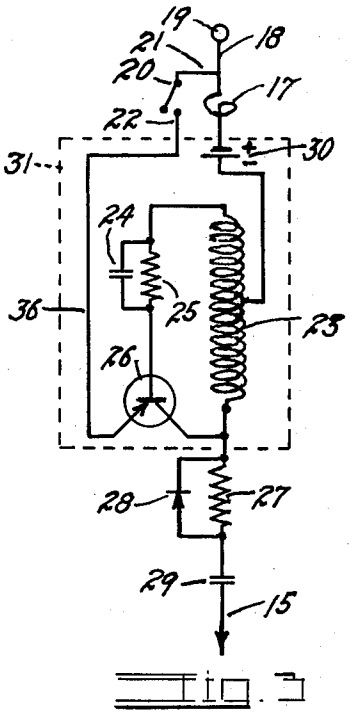


Fig. 3

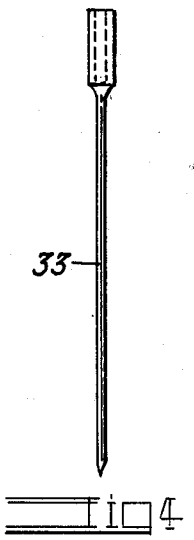


Fig. 4

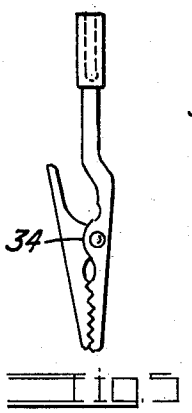


Fig. 5

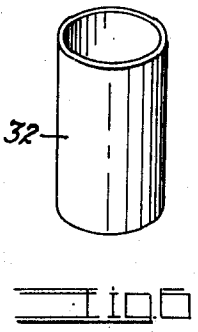


Fig. 6

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MODULATED PORTABLE SIGNALING OR TEST TRANSMITTER

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U.S. Cl. 325—105 4 Claims

ABSTRACT OF THE DISCLOSURE

A miniature transistor oscillator circuit energized by 1.5 v., hearing-aid battery cell, all encased in a portable, suspendable, tubular, insulated container closed at its upper extremity with a threaded cap having a metallic contact band which, when the cap is tightened, contacts a second contact band on the container, to close the battery circuit to the oscillator so as to emit a modulated radio frequency signal from an antenna pin at the lower extremity of said container.

The invention is particularly useful for: locating circuits and circuit elements in electrical and electronic devices; for tracing individual conductors in multi-conductor phone cables; for locating paths and passages for electrical conductors, antenna leads and other electrical conductors in building structures; for locating metallic conduits, pipes and other metallic elements in the walls and floors of such structures; and for injecting a signal into R.F. audio circuits for testing for a signal or lack of signal therein. Other uses will become apparent to those skilled in the art from the following specification.

The principal object of this invention is to provide a miniature, self-contained, self-energized and encapsulated transistor oscillator which can be readily carried in the hand and lowered from the roof or attic through the walls and floors of a building to locate a passage for an antenna lead and which, when in its final position, can be located by simply passing an electronic receiver, such as a pocket-type transistor radio, over the exterior faces of the building structure to enable the receptacle hole to be cut at the proper position.

Other objects and advantages reside in the detail construction of the invention, which is designed for simplicity, economy, and efficiency. These will become more apparent from the following description.

In the following detailed description of the invention, reference is made to the accompanying drawing which forms a part hereof. Like numerals refer to like parts in all views of the drawing and throughout the description.

In the drawing:

FIG. 1 is an enlarged, side elevational view of the portable location signal transmitter of the invention;

FIG. 2 is a similarly enlarged, vertical, diametric sectional view of the transmitter showing the relative locations of the internal circuit elements therein;

FIG. 3 is a circuit diagram of the transmitter; and

FIGS. 4, 5, and 6 illustrate typical adaptors which can be applied to the transmitter for different purposes to be hereinafter described.

The transmitter is enclosed in and supported by a vertical, tubular, molded, cup-like barrel **10** of plastic or other suitable electrical insulating material. The open upper extremity of the barrel **10** is internally threaded, as indicated at **11**, to receive a threaded nipple **12** projecting downwardly from a conical cap **13**, also formed of insulating material and corresponding substantially to the external diameter of the barrel **10**. The bottom of the barrel is closed, as indicated at **14**, and a metallic antenna pin **15** is molded in, and projects axially downward from,

the closed bottom **14**. In actual practice the barrel is ½" in diameter and 2" in length.

The cap **13** is formed with a concentric, upwardly-extending spring socket **16** containing an axially-positioned, compression spring **17** which normally projects below the nipple **12** of the cap **13**. A suspension pin **18**, terminating in an open loop **19** at its upper extremity, is molded, or otherwise mounted, in the cap and projects upwardly therefrom and is electrically connected to the spring **17** within the cap.

A cylindrical metallic upper contact band **20** surrounds the base of the cap and circumferentially projects downward below the bottom thereof. The upper contact band is electrically connected to the spring **17** by means of an internal conductor **21**. A second lower metallic contact band **22** is fixed about the upper open extremity of the barrel **10** and projects above the barrel in circumferential alignment with the upper contact band **20** so that when the cap is screwed tightly onto the barrel, the two bands will contact each other so as to close an electrical circuit.

The circuits and elements, of a conventional inductive-coupled transistor oscillator **31**, as enclosed in the broken line rectangle in FIG. 3, are mounted in the hollow interior of the barrel as shown in FIG. 2. The oscillator **31** employs an encased inductive coil **23** the primary of which is modulated by a condenser **24** and a grid or base lead resistor **25** to supply current to the base of a transistor **26**. The emitter of the transistor **26** is coupled by a conductor **36** to the lower contact band **22** on the barrel **10**. The collector of the transistor **26** is connected to the secondary of the coil **23**, to oscillate at a modulated, permanently-tuned radio frequency and is connected, through a coupled resistor **27** and a diode **28**, to supply a rectified D.C. half-wave, modulated signal of corresponding frequency to the antenna pin **15**, through a coupling condenser **29** which acts to isolate the suspension pin **19** from the antenna pin **15** to reduce the possibilities of damage from accidental shorts across live external A.C. and D.C. circuits. The resistor **27** and the diode **28** have been added to the conventional oscillator circuit to produce a more distinctly audible signal due to the separated half-wave effect.

The above oscillator is energized by a one and one-half v. battery **30**, of the type usually employed in hearing aids. The battery **30** is positioned in the top of the barrel **10** on the center tap of the case of the coil **23** so that the spring **17** will contact the positive pole of the battery and urge the negative pole thereof against the center tap of the coil **23** to complete the positive battery circuit to the upper contact band **20** of the cap **13**.

Should it be desired to increase the radiation from the antenna pin **15** an extension pin, such as shown at **33**, FIG. 4, may be telescopically fitted over the antenna pin **15** to increase the length and the radiation field thereof. The extension pin also serves to more conveniently reach difficulty accessible elements in various electronic circuits. If it is desired to detachably couple the antenna pin **15** to a conductor for testing or tracing purposes, an alligator clip, such as shown at **34** in FIG. 5, may be telescopically fitted over the antenna pin **15**.

If the transmitter is to be used in crowded, complicated circuits where a multi-directional emission would interfere with probing and tracing. A metallic, shielding sleeve **32**, such as shown in FIG. 6, having an internal diameter to enable it to be snugly slid over the barrel **10**, can be positioned as indicated in broken line at **32** in FIG. 1 to reduce lateral wave transmission and concentrate the emission at the antenna pin **15**. However, where a wide field of radiation is desired, it is advisable to remove the shielding sleeve **32** from the barrel **10**. To renew or replace the battery **30**, it is only necesary to remove the cap **13** and dump the used battery from the barrel **10** and replace it with a

new battery. Replacement of the cap causes the spring **17** to automatically contact the battery and threading the cap tightly into position on the barrel automatically closes the battery circuit through bands **21** and **22.**

The pin **18** and its loop **19** is more particularly for suspending the transmitter by means of a cord in building structures. However, it all serves as a positive lead, when the bands **21** and **22** are out of contact, for testing continuity and for locating a single conductor in a multi-conductor cable, the lower band **22** being used as the negative lead to complete the test circuit to the oscillator.

While a specific form of the invention has been described and illustrated herein, it is to be understood that the same may be varied within the scope of the appended claims, without departing from the spirit of the invention.

Having thus described the invention what is claimed and desired to be secured by Letters Patent is:

1. A portable location-signaling transmitter comprising:

(a) an elongated, tubular, insulated, cup-like barrel having an open upper extremity;

(b) an insulated cap threaded into and closing the upper extremity of said barrel;

(c) a metallic antenna pin axially projecting from the lower extremity of said barrel;

(d) a battery enclosed in said barrel; and

(e) a transistor oscillator circuit enclosed in said barrel energized by said battery; and

(f) a coupled resistor and diode modulator in series between said oscillator circuit and said antenna pin to radiate a modulated R.F. signal from said pin.

2. A portable location-signaling transmitter as described in claim **1** having attachment means mounted on said insulated cap whereby said barrel may be suspended from a suspension element one pole of said battery being electrically connected to said attachment means.

3. A portable location-signaling transmitter as described in claim **1** having:

(a) a first annular, metallic band connected with a pole of said battery and surrounding the lower extremity of said insulated cap; and

(b) a second similar annular, metallic band in series with said oscillator circuit mounted on and surrounding the upper extremity of said insulated barrel and positioned so that when said cap is threaded into said barrel said two bands will annularly and mechanically contact each other to close a circuit between said battery and said oscillator circuit.

4. A portable location-signaling transmitter as described in claim **2** in which said modulator acts as rectifying means in series between said oscillator circuit and said antenna pin to rectify the signal emitted by the latter to a modulated, half-wave frequency.

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200—52; 331—68, 76; 325—111, 119