Feb. 17, 1959 J. VARLEY 2,874,292

EMERGENCY SIGNALING DEVICE

Filed May 21, 1956

Fig. 1

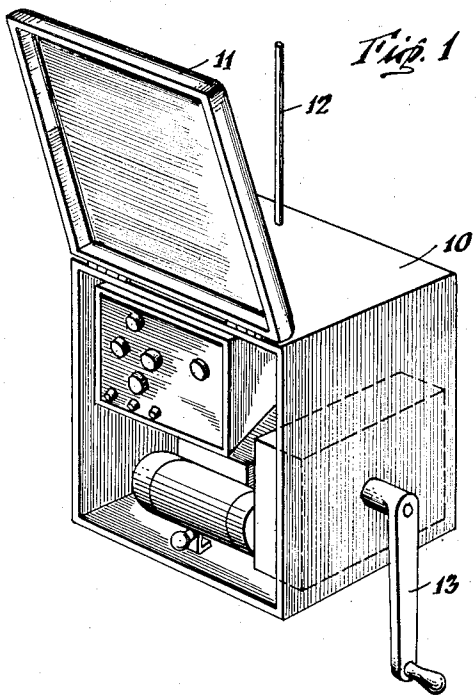



Fig. 5

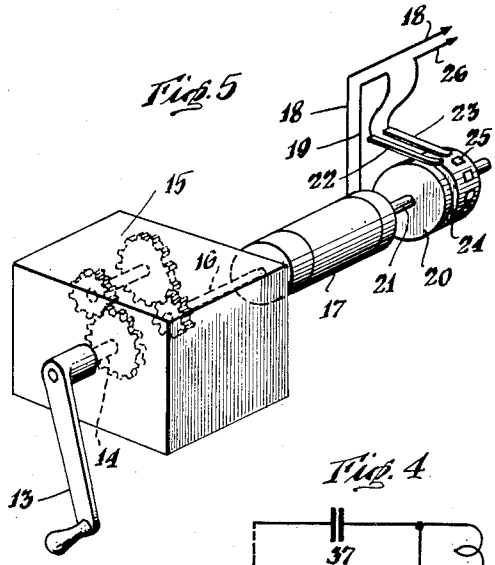



Fig. 4

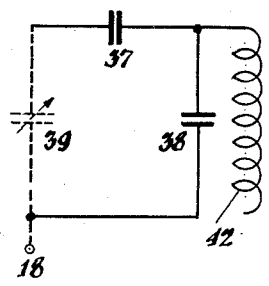



Fig. 2

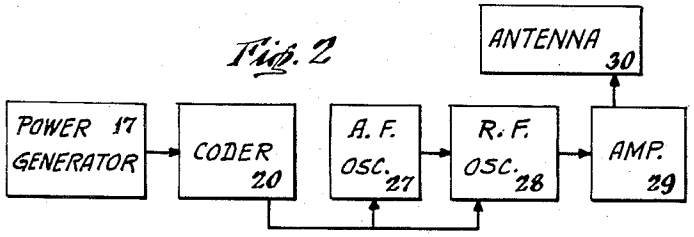
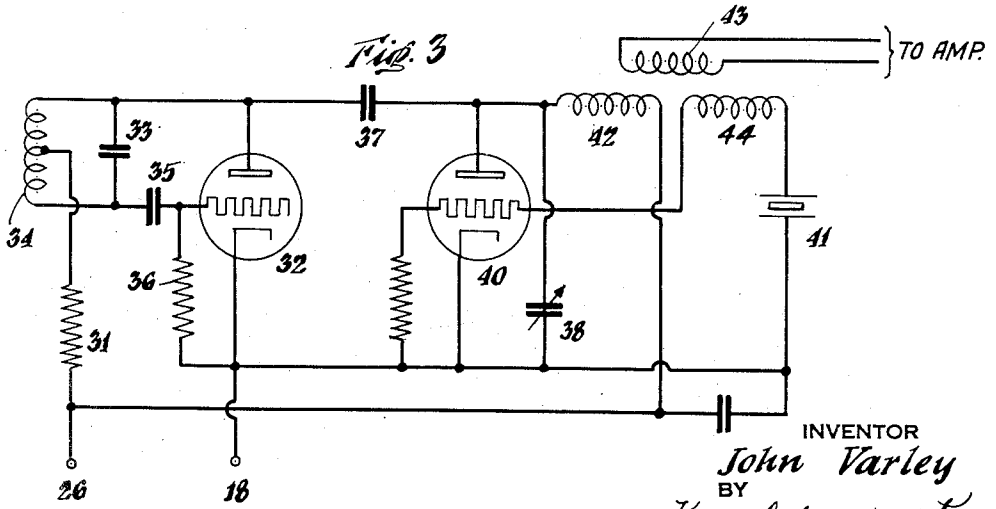



Fig. 3




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# EMERGENCY SIGNALING DEVICE

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1 Claim. (Cl. 250—36)

This invention relates generally to a method and apparatus for emergency signaling and more particularly relates to a method and apparatus for transmitting an emergency signal which can indicate the geographic position of the person signaling.

Present day highways often stretch across lonely areas where there is sparse population resulting in little or no contact between the occupants of an automobile on the highway and other human beings for long periods. Often a motorist on one of these lonely highways will encounter mechanical difficulty with his vehicle, or an accident will occur requiring that immediate help be given the injured person. Immediate contact must be made with authorities who can furnish aid, but often facilities for communication are not available.

Police in the United States have attempted to cope with this problem in various ways. Some highways have located thereon telephones which distressed motorists may use in order to call for help. This is unsatisfactory, however, since remote areas of highway do not always have power lines available. Although these roads are well patrolled by police, the immediate requirement for aid cannot be met unless the person or persons requiring aid can immediately signal to the police their geographic position so that aid can be rushed to their precise location.

The invention herein disclosed has as its principal object the provision of a method whereby one of a series of geographic locations along a highway can be determined at a receiving station.

Another object of the present invention is to provide a method whereby signals can be transmitted to a receiving station without the use of interconnecting wires.

A further object of this invention is the provision of a method of crystal controlled frequency modulation signaling which is completely self-powered and easily integrated with any existing emergency signaling system.

Another object of this invention is the provision of a signaling device which is self-contained and which does not require an experienced operator.

Still another object of the present invention is to provide a signaling device which requires no external supply of power or internal battery.

A further object of this invention is the provision of a signaling device which is compact and easily transportable so that it may be quickly prepared for use in any desired location.

Another object of the present invention is to provide a signaling device which is sturdy and rugged so that exposure to the elements will not adversely affect the device or alter a signal transmitted therefrom.

Still another object of the present invention is to provide a signaling device which is so designed that neither usage nor non-usage will alter a signal transmitted therefrom.

The emergency signaling device and method of using the same is described herein with reference to the drawings in which:

Fig. 1 is a perspective view of the emergency signaling device;

Fig. 2 is a functional block diagram of the emergency signaling device;

Fig. 3 is a circuit diagram of the oscillator section of the emergency signaling device;



Fig. 4 is a portion of the circuitry shown in Fig. 3; and

Fig. 5 is a detailed view of the power generator and coder portion of the emergency signaling device.

As shown in the figures and especially Fig. 1, the emergency signaling device consists of a box-like structure designated as **10** having a cover **11** hingedly connected thereto. Situated within box **10** are all of the components of the signaling device. Thus, a compact unit is achieved.

Antenna **12** extends from the top of box **10** and handle **13** extends from a side of the box. Antenna **12** is the output portion of the signaling device. From this antenna signals are transmitted to a central receiving station, not shown in the drawings at which the coded signal is decoded so that the receiver can know the exact position of the person using the emergency signaling device.

Handle **13** is attached to shaft **14**, which is connected through gearing **15** to shaft **16** and power generator **17**. Gearing **15** is so designed that slight rotation of shaft **14** will effect many rotations of shaft **16** thus there is a step-up ratio between shaft **14** and shaft **16**. Power generator **17** is any familiar D. C. generator known to the art of the type such that rotations of shaft **16** will develop a voltage potential between leads **18** and **19** which extend outwardly from generator **17**.

Coder **20** is mechanically coupled to generator **17** by shaft **21** so that rotation of shaft **16** will cause rotation of shaft **21**. Coder **20** consists of a rotary drum and brushes **22** and **23** which are electrically connected to lines **19** and **26** respectively. Contactor **24** extends about the periphery of coder drum **20** and during rotation of the drum is continually in contact with brush **22**. Conducting portions such as **25** are also peripherally positioned on drum **20** so that as drum **20** rotates they intermittently contact brush **23**. Conductor **24** and conductor portions **25** are connected internally so that at each instance when brush **23** is in contact with a conducting portion **25** a connection between lines **19** and **26** results and voltage which is across lines **18** and **19** is placed across lines **18** and **26**. At any instance when brush **23** is not in contact with a conducting portion **25** the circuit is broken and no voltage appears between leads **18** and **26** although potential is available between leads **18** and **19**.

The coding means shown is illustrative only and it should be understood that any coding means can be used to practice this invention. It is necessary only that such coding means be capable of control of the power output of generator **17** and be easily adaptable so that changes in the coding can be made with a minimum of effort.

Each emergency signaling device is particularly coded so that upon receipt of a signal therefrom, the receiver can know from which signaling device the signal came. The effect of this coding upon the output signal will be explained below.

A functional block diagram of the system is shown in Fig. 2. Power generator **17** transmits D. C. power via coder **20** to audio frequency oscillator **27** and radio frequency oscillator **28**.

Audio frequency oscillator **27** can be any type of audio oscillator which is designed so that oscillation will occur during the periods when power is supplied to the system. By use of the coder **20** power from power generator **17** is intermittently applied and audio frequency oscillator **27** only oscillates during the periods when such power is supplied.

Radio frequency oscillator **28** can be any radio frequency oscillator which like audio frequency oscillator **27** will oscillate during periods when power is supplied thereto.

Thus oscillators **27** and **28** will only operate during the period when coder **20** allows generated power from

power generator 17 to be applied thereto. Audio frequency oscillator 27 and radio frequency oscillator 28 are coupled together in such manner that oscillator 27 operates to modulate the signal developed in oscillator 28. The circuitry of audio frequency oscillator 27 and radio frequency oscillator 28 and their coupling is shown in detail in Fig. 3 which will be described below.

Referring again to Fig. 2 it is seen that amplifier 29 receives the modulated radio frequency signal from oscillator 28 and after amplifying this signal applies it to antenna 30 which is the output of the emergency signaling device. The signal transmitted from this antenna is received at a receiver (not shown in the figures) where the coded signal is interpreted.

The circuitry of audio frequency oscillator 27 and radio frequency oscillator 28 and their coupling will be now described with reference being had to Fig. 3. Power from lead 26 is applied to resistor 31 thereby furnishing A. C. power and enabling the audio frequency oscillator and the radio frequency oscillator to oscillate. The audio frequency oscillator utilizes triode vacuum tube 32. Condenser 33 and inductance 34 comprise a tank circuit which determines the frequency of oscillation of the audio oscillator. Condenser 35 couples this tank circuit to the grid of tube 32, and resistance 36 serves as a grid leak resistor. Triode vacuum tube 32 with its associated components generates a sinusoidal voltage at an audio frequency which is determined by the tank circuit composed of inductance 34 and capacitor 33.

During any period when power is applied at lead 26 coincidental with and as a result of the generation of audio frequency voltage is the changing of the internal plate to cathode capacitance of vacuum tube 32. This controlled plate to cathode capacitance change is coupled through fixed capacitance 37 to variable capacitance 38. This is shown in Fig. 4 where the plate to cathode capacitance of tube 32 is indicated by an equivalent condenser designated 39.

Triode vacuum tube 40 together with its associated circuitry and crystal 41 comprise a crystal controlled radio frequency oscillator. Inductance 42 and condenser 38 compose its plate tank circuit. Variations of capacitance 39 change the resonant frequency of the plate tank circuit comprised of inductance 32 and capacitor 38.

The first oscillator serves as a simple audio tone generator which changes the internal plate to cathode capacitance of tube 32, regularly and sinusoidally with the amplitude of audio signal. The first oscillator acts as a capacitor in series with the tank circuit of the second oscillator and the combination by its tuning determines the frequency of the radio frequency oscillations (insofar as crystal 41 can be "pulled"). As the capacitance of the first oscillator tube changes the tuning of the tank circuit changes and the frequency of the radio frequency oscillator changes as the crystal is "pulled." Therefore the radio frequency oscillators frequency of oscillation is varied above and below the mean frequency of the crystal within the allowable frequency excursion of the crystal.

Varying the resonant frequency of plate tank circuit 38—42 above and below the natural frequency of crystal 41 within the allowable limits of crystal 41 results in a variation in the frequency at which the radio frequency oscillator is oscillating and since this variation is impressed on the radio frequency wave by the audio frequency oscillation, an audio frequency modulated radio signal is developed at coil 43 which is transmitted to amplifier 29 and thence to antenna 30.

Therefore, it is seen that no signal appears at antenna 30 during those periods when the power generator is not operating or, if the power generator be operating when coder 20 is preventing transmittal of D. C. power to audio frequency oscillator 27 and radio frequency oscillator 28. However, during any period when D. C. power is applied to both the audio frequency oscillator and the radio frequency oscillator, a frequency modulated signal appears at antenna 30.

A radio frequency signal therefor can be transmitted merely by an operator turning crank 13. The power required to operate this system is supplied by hand-operated generator 17 which is voltage regulated and actual use of the system to transmit intelligent coded signals is effected by code disk on the generator shaft.

Since the unit is complete in itself and compact it may be easily placed at any spot and any one of a number of coded messages may be transmitted simply by having different coded disks at each generating station and these coded disks may be easily changed to alter the signal from any generator. Also since the frequency is controlled by a crystal, it is precise and accurate and since the system is of the simple on or off type, variations will not occur due to usage or non-usage.

Thus, among others, the several objects in the invention as specifically aforenoted are achieved. Obviously, numerous changes in construction or arrangement of the parts might be resorted to without departing from the spirit of the invention as defined by the claim.

I claim:

In an emergency signaling device a triode vacuum tube, an inductor connected between the grid and plate of said vacuum tube, a capacitance connected in parallel with said inductor, a second capacitance connected in series between the combination of said inductor and said first capacitance and the control grid of said vacuum tube, a grid resistance connecting the grid of said tube to the cathode of said tube, said inductor and said first capacitance being of such values that oscillations at certain audio frequencies can occur in said vacuum tube; a direct current voltage lead connected to said inductor for applying direct current voltage thereto, a second triode vacuum tube, a second inductor connected between the plate of said second vacuum tube and said direct current voltage lead, a third capacitance connected between the plate of said second vacuum tube and a cathode of said second vacuum tube, said second inductor and said third capacitance being of such values that they can achieve a resonant frequency, a third inductor coupled to said second inductor, a quartz crystal in series with said third inductor, the values of said third inductor and said quartz crystal being such as to enable resonance to be achieved at a radio frequency close to the resonant frequency of the combination of said second inductor and said third capacitance; a fourth capacitance connecting the plate of said first vacuum tube and the plate of said second vacuum tube, the value of said capacitance being such as to offer minimum reactance to the audio frequency oscillations generated by said first vacuum tube and which permit the resulting changing plate to cathode capacitance of said first vacuum tube to be coupled in parallel with said second inductor and said third capacitance and the resultant changing grid to cathode capacitance of said second vacuum triode to be coupled in parallel with said third inductor and said quartz crystal in phase with the changing capacitance of said second inductor and said third capacitance combination; and means for energizing said direct current voltage lead.

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