

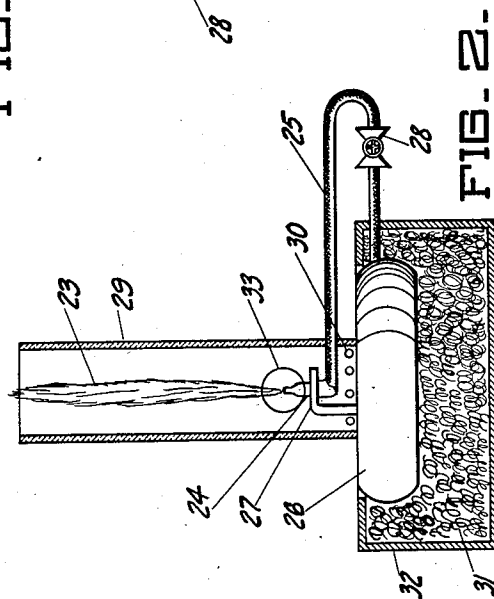
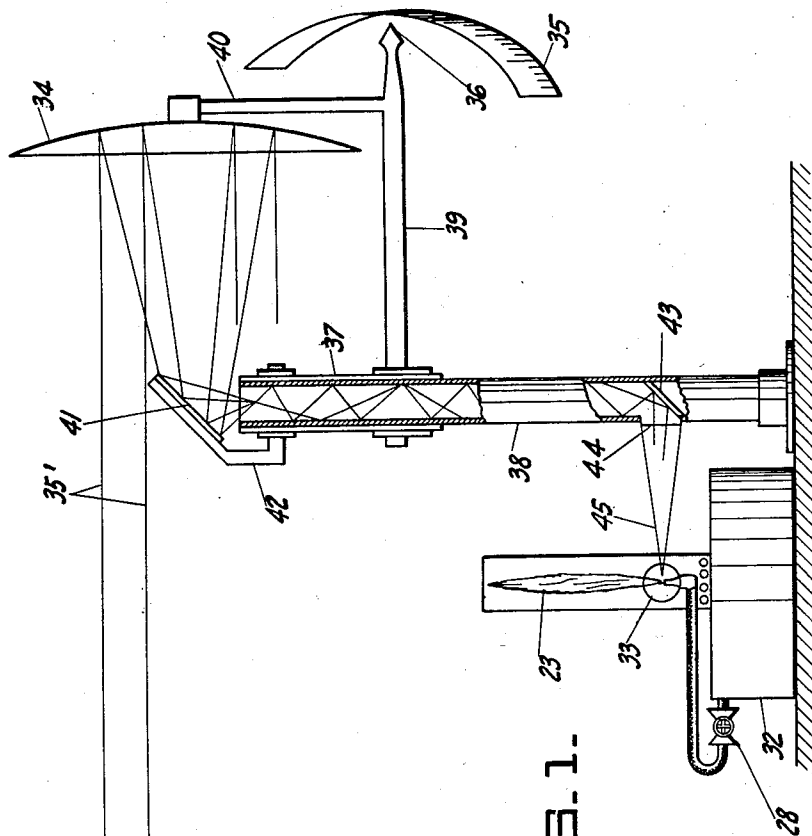
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HIGH FREQUENCY WAVE SIGNALING SYSTEM

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HIGH FREQUENCY WAVE SIGNALING
SYSTEM

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5 Claims. (Cl. 250—1)

This invention relates to a signaling system, and especially to one in which very high frequency waves propagated through an elastic medium are utilized.

Extremely high frequency mechanical waves have heretofore been capable of propagation in an elastic medium as by the aid of quartz crystals subjected to varying electric stresses. It has been found in such prior systems that when it is attempted to propagate the waves in air or other gaseous mediums, the amount of energy imparted thereto is very small indeed. This is due to the extremely small amplitude of vibration of the crystal, which may be effective enough in solid or liquid media to transmit a large amount of energy, but which are incapable of very materially affecting a more diffused medium such as a gas.

It is one of the objects of my invention to make it possible to propagate such waves in air or other gaseous media of sufficient intensity to be useful for signaling.

I find that an electric spark oscillator is very well adapted to produce these mechanical waves; and it is accordingly another object of my invention to make it possible to utilize such an electric spark oscillator in an efficient and convenient manner for that purpose.

High frequency elastic waves have the property of being projectible in definite directions; and this property is found to be more pronounced as the frequency increases. Therefore it is entirely feasible to provide directional signaling as by proper reflectors, and also to determine the source of such waves so directed, by a directional pick-up scheme. It is thus another object of my invention to make it possible to secure such directional effects in a simple and convenient manner.

It has been found that a flame under proper conditions is very sensitive to such waves of high frequency; and I contemplate the use of such a flame for receiving the wave impulses.

Thus when such waves are received by a flame that is at its maximum stable height, the height of the flame is materially reduced, and it becomes rough and produces a roaring sound. It is another object of my invention to provide a flame receiver of this kind that is simple and convenient for my purposes.

My invention possesses many other advantages, and has other objects which may be made more easily apparent from a consideration of one embodiment of my invention. For this purpose I have shown a form in the drawing accompanying and forming part of the present specification. I

shall now proceed to describe this form in detail, which illustrates the general principles of my invention; but it is to be understood that this detailed description is not to be taken in a limiting sense, since the scope of my invention is best defined by the appended claims.

Referring to the drawing:

Figure 1 is a schematic diagram of a complete system embodying my invention; and

Figure 2 is a diagrammatic view of the receiving device that can be used with my invention.

In Figure 1 I show in general a wave transmitting system in which an oscillatory spark discharge is obtained between a pair of electrodes 11 and 12, arranged substantially at the focal point of a reflector 13, shown as of parabolic form to produce a beam of waves. These electrodes can be supported in any appropriate manner; as for example, by the aid of insulation supports 14.

The electrode 11 is shown as adjustable in its support, and electrode 12 is preferably hollow and concentric with electrode 11, in order to permit compressed air or other gases to be passed between the electrodes. It has been found that when such a stream of air is passed between the electrodes, the energy transmitted in the form of high frequency waves is increased. For supplying the compressed air, I show a container 15 from which leads a conduit 16 fastened to the electrode 12. A valve 17 controls the passage of air to electrode 12.

The spark is energized or excited by the aid of an oscillatory circuit including inductance 18 and condenser 19, the spark electrodes being connected across both these elements. A coil 20 inductively coupled to inductance 18 serves to excite the oscillatory circuit. This coil is supplied with commercial alternating current through leads 21 and controlling impedance 22. When the system is in operation, the condenser 19 periodically discharges and causes an oscillatory discharge between electrodes 11 and 12. All this is well understood in connection with the propagation of radio waves. In the present instance, however, the oscillatory electrical discharge is not directly utilized; instead, the elastic mechanical waves produced by the spark are transmitted by reflector 13.

I have discovered that upon starting the spark, it produces a first impact of waves which are of such low frequency that they are within the range of audibility; accordingly the ear alone can be used for picking up these first impulses. However, the later impulses are inaudible, and must be received by a special apparatus. In the pres-

ent instance, such an apparatus is shown as by a sensitive flame 23. This flame is formed at the restricted opening of a burner 24 (Fig. 2) fed with fuel through conduit 25 from a fuel reservoir 26 holding fuel in compressed form. The burner 24 can be supported in any appropriate manner, as by bracket 27. The passage of fuel can be controlled by valve 28.

The flame 23 is protected from extraneous disturbances by a tube 29, transparent so as to permit the flame to be seen. Holes 30 can be located near the bottom of this tube to permit air to pass to the burner 24. These holes are preferably shielded against a too violent passage of air there-through, so as to maintain flame 23 in proper operative condition and without deleterious effect from local air disturbances. For ensuring against other mechanical disturbances, the whole flame producing structure can be mounted on a resilient support 31, such as felt or sponge rubber held in a container 32.

In order that the flame 23 be influenced by the high frequency vibrations, a thin diaphragm 33 is provided in an aperture in tube 29 and adjacent the restricted opening of burner 24. This diaphragm must be made from very thin material. The thinnest possible layer of mica is well adapted for this purpose, as it permits the ready passage of the high frequency elastic waves. Alternatively, very thin aluminum foil or other light thin substances may be employed.

At the right hand portion of Figure 1, I show a receiving system whereby the waves can be focussed onto diaphragm 33, and preferably in such a way that the direction of the source can be determined.

For this purpose, there is a reflector 34 (preferably parabolic) that serves to converge the rays 35' from the source, which reflector is mounted to rotate on a vertical axis. Thus the reflector must be alined with the beam of waves 35' in order to produce any effect upon the flame 23. Its alined position can be shown by a stationary scale 35 and a pointer 36 that forms a part of the movable reflector structure. The reflector structure includes a tube 37 rotatable on a stationary standard 38. At the lower part of the tube 37 the arm 39 is provided, forming the pointer 36 at its extremity, and also providing a vertical support 40 for reflector 34.

The manner in which the high frequency waves can be conducted to diaphragm 33 will now be described. The converging rays reflected from reflector 34 are caused to fall upon another reflector 41, this reflector being arranged to be moved in unison with the main reflector 34. This can be accomplished readily by mounting reflector 41 on a support 42 that is carried at the upper end of tube 37.

The reflector 41 is so tilted that the rays reflected therefrom are directed downwardly into standard 38, which is made hollow for this pur-

pose. These rays finally impinge, after perhaps several reflections from the inner wall of standard 38, upon a reflector 43 located near the bottom of the standard and positioned to direct the reflected waves through a window 44 in the standard and toward diaphragm 33. The course of the waves can be confined by the aid of a tapered tube 45.

In order to receive signals and to determine their direction, the parabolic reflector 34 is rotated until the flame 23 is affected. The position of the reflector with respect to a fixed reference can then be determined by the aid of of pointer 36, and this corresponds also to the direction of the transmitted waves. It is evident that if reflector 34 be turned away from the source, there will be a diminished response since less energy is directed into tube 38.

I claim:

1. A directional receiver for mechanical high frequency elastic waves, including a rotatable reflector, means providing a stationary sensitive flame, and means whereby the waves reflected by said reflector are directed to said flame.

2. The combination as set forth in claim 1, in which the reflector is so formed that it concentrates the received waves and passes it onto the sensitive region of the flame only when the reflector is alined with the transmitted waves.

3. The combination as set forth in claim 1, in which the reflector is so formed that it concentrates the received waves and passes it onto the sensitive region of the flame only when the reflector is alined with the transmitted waves, comprising another reflector movable in unison with the first reflector, means forming a passageway into which said other reflector directs the waves, and a tube interposed between the sensitive region of the flame and the passageway.

4. In combination, a hollow standard, means for forming a sensitive flame arranged adjacent the standard, a tube rotatable on said standard, a parabolic reflector supported by the tube and having a horizontal axis, another reflector also supported by the tube and arranged to deflect the waves from the parabolic reflector into the hollow standard, and means for affecting the flame by the waves received in said standard.

5. In combination, a hollow standard, means for forming a sensitive flame arranged adjacent the standard, a tube rotatable on said standard, a parabolic reflector supported by the tube and having a horizontal axis, another reflector also supported by the tube and arranged to deflect the waves from the parabolic reflector into the hollow standard, and means for affecting the flame by the waves received in said standard, comprising a third reflector in the standard for reflecting the waves through a window in the standard.

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