

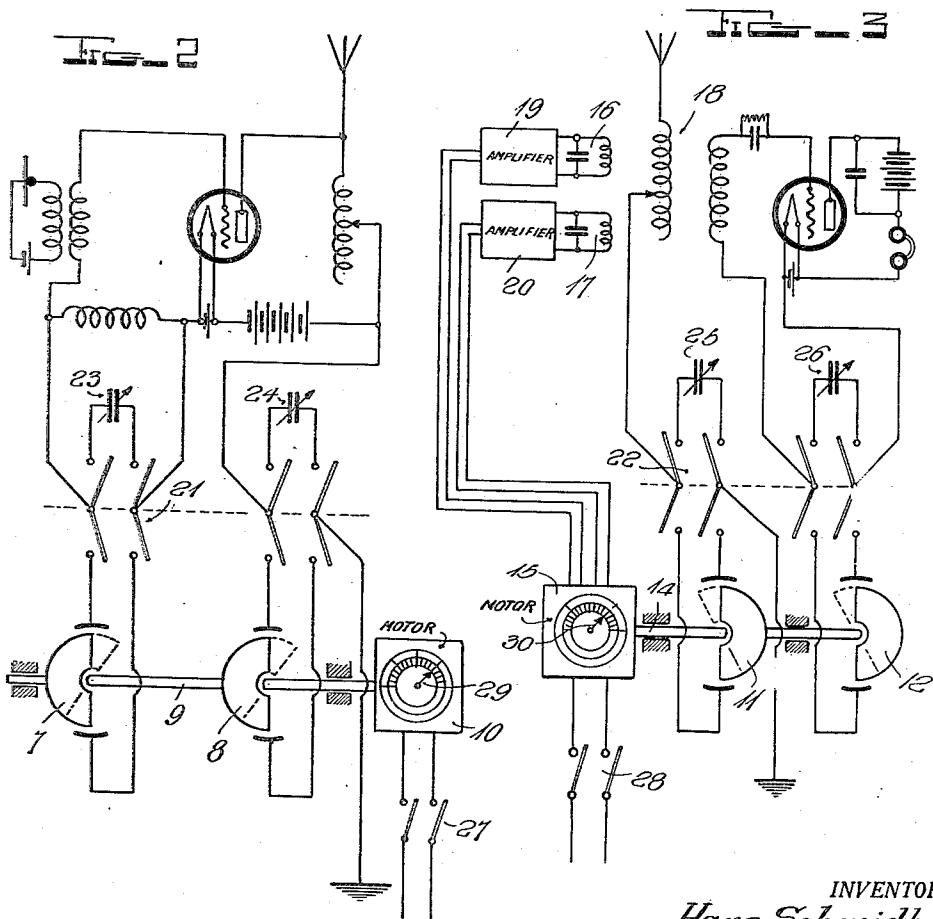
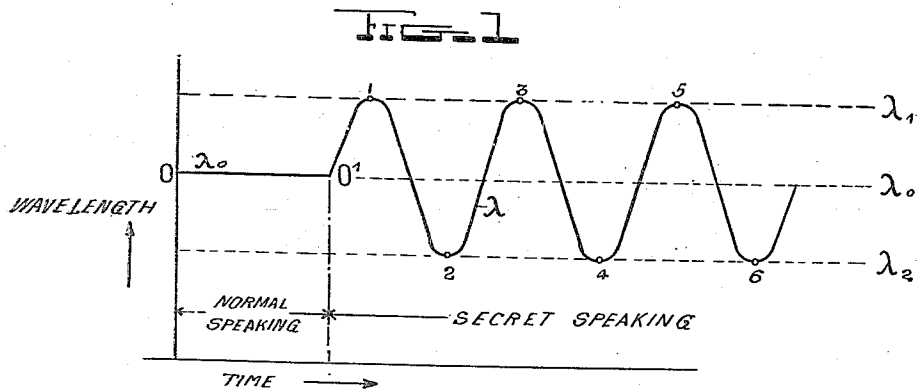
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WIRELESS SECRET TELEPHONY

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WIRELESS SECRET TELEPHONY.

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The invention concerns a method for secret wireless telephony by which it is made impossible for other stations than that for which the messages are destined to listen in or overhear the messages transmitted. This method does not employ a constant wave but a wave which is variable similar to a sinus or according to any other function where a wave varies above or below a fundamental wave. Such preferably periodical change of wave may be effected by inserting into the tuning system of the transmitter such as into the grid and antenna circuit variable tuning elements consisting of self-inductance or capacity and operating these two elements jointly by means of a mechanical coupling. If these coupled tuning elements are constantly moved for instance by means of a gear or of a motor with constant number of revolutions, the effect is a change of the transmitting wave corresponding to the diagram in Figure 1 in which the wave λ varies with respect to a basical or fundamental wave λ_0 in a sinusoidal curve between the upper distuning wave λ_1 and the lower distuning wave λ_2 . The number of periods of this curve depends upon the number of revolutions of the driving apparatus of the variable tuning elements, and the values of the upper and lower distuning waves are destined in accordance with the selfinductance or capacity of the tuning elements.

In the drawings, Figure 1 is a diagram showing the variation of wavelength between upper and lower limits as plotted against time, Fig. 2 shows the circuit connections at a transmitting station and Fig. 3 shows the circuit connections at a cooperating receiving station.

In order to obtain a transfer of speech with such variable transmitting wave the tuning of the receiver, according to this invention, is varied in synchronism with the variation of the length of transmitting wave in timed relation with and according to the length of wave in such way that the receiver adjusts itself at each instant on the identical wave which radiates at that instant from the transmitter. The timed relation of the tuning of the receiver is made in exact synchronism with the variation of the transmitter tuning. To effect this variable capacitive or inductive tuning elements may be inserted into the primary and into the secondary circuit of the receiver and these two elements constantly worked by a common mechanical

coupling in synchronism with the variable tuning elements of the transmitter by means of a suitable gear or a motor.

The synchronism of the variable receiver tuning may be controlled and maintained by providing two resonant circuits in the receiver, one of which responds to the upper distuning wave λ_1 and the other to the lower distuning wave λ_2 of Figure 1 and each effects in any suitable manner as, for instance by magnetic means, on adjustment for driving slower or faster the gear of the tuning elements of the receiver. These resonance circuits become effective as indicated in the diagram of Figure 1 at the upper turning points 1, 3, 5, etc. and respectively at the lower turning points 2, 4, 6 etc. of the curve but may of course also be tuned to other wavelengths.

For compensating any small deviations from synchronism of the variation of wave at the transmitting and at the receiving station the receiver may employ one further variable tuning element by which the receiver may be turned to the transmitter before commencing the secret conversation. This adjustment may be effected by hand and serves to compensate any phase displacement between the curves of the variation of waves in the transmitter and in the receiver. The synchronism once obtained by the resonance circuits of the receiver which respond for instance to the upper and lower distuning waves will be maintained so long as the transmitting frequencies are held constant. The variable tuning elements of the transmitter and receiver of one and the same wireless station will preferably be put into motion by one identical gear, the synchronism of which is at the time of secret conversation effected by means of the resonance circuits of the receiver.

The Figures 2 and 3 illustrate a suitable circuit for transmitting and receiving in order to carry out the new method of secret conversation. The transmitting circuit of Figure 2, is operated in well known manner, and contains in its antenna circuit and in its grid circuit a variable tuning element as for instance a variable condenser 7 and 8 respectively. These two condensers are mechanically coupled, for instance by means of a common axis 9, from a driving appliance for instance a motor 10. By this the transmitting wave is continually varied in accordance with the cycle curve of Figure 1. In the

receiving circuit of Figure 3 which may also be of a conventional type in both the primary and in the secondary circuit is inserted one variable condenser 11 and 12 respectively, or any other variable tuning element. The two variable condensers 11 and 12 are made to rotate about a common axis 14 in synchronism with the variable condensers 7 and 8 of the transmitter of Figure 2 by means of motor 15 and are so selected that they vary the tuning of the receiving circuit in correspondence with the cycle curve of Figure 1.

In order to maintain motor 15 in synchronism with the motor 10 of the transmitting circuit, there are in accordance with Figure 3 at the receiving station two resonance circuits 16 and 17 coupled with the primary circuit 18 which resonance circuits respond respectively to the upper and the lower distuning waves of the transmitter. The resonance circuit 16 is for instance tuned to the wave λ_1 and the resonance circuit 17 to the wave λ_2 of Figure 1 which means that these circuits always respond at the maximum and minimum points of the wave curve of Figure 1 and then influence for instance via the amplifiers 19 and 20 the motor 15 in such way that magnets may be excited by the current from the resonance circuits which according to the requirement accelerate or brake the motor 15 and thereby restore any asynchronism to exact synchronism with the motor 10 of the transmitter.

The conversation or traffic of the transmitter of Figure 2 and the receiver of Figure 3 goes on in such way that both stations are initially adjusted by means of the reversing switches 21 and 22 to ordinary speech communication in which instead of the motor driven variable tuning elements 7, 8, 11 and 12 the hand adjusted variable condensers 23, 24, 25 and 26 are operated. After having established a communication channel with this circuit, which corresponds to the curve part 0, 0' of Figure 1 for ordinary speaking, the motors 10 and 15 are connected by means of the switches 27 and 28. By means of mechanical indicators such as rotating members 29 and 30 provided at the motors 10 and 15 the two stations communicate with one another as to when the two motors 10 and 15 are running in synchronism. As soon as this is the case the tuning elements 7, 8, 11 and 12 are inserted by turning the switches 23 and 22 and the circuit for secret conversation is now established, the transmitting wave now being varied in accordance with the curve part 1 to 6 of Figure 1 and the tuning of the receiving station varying accordingly.

The synchronism of the motors 10 and 15 is maintained by the resonance circuits 16 and 17 which periodically adjust the speed of the motor 15 with respect to the maximum and minimum points of the wave curve of Figure 1.

Various forms of synchronizing devices may be employed in association with motor 15 for structures of synchronizing devices capable of employment in association with the motor 15 will be found in Letters Patent to Henry H. Rowland, dated Jan. 21, 1902 and Letters Patent to F. J. Patten, Nos. 395,508, 395,509 and 395,510, dated Jan. 1, 1889.

The variation of distuning the transmitting wave and the corresponding variation of the tuning of receiver may also be effected aperiodically instead of after and in accordance with a periodically variable curve. For influencing driving apparatus of the variable tuning elements at the receiving station any kind of relay appliance may be used which is controlled by the currents from the resonance circuits. The current may directly influence the field windings of the motor, as for example in case of an electro-motor.

While I have described my invention in one of its preferred embodiments, I desire that it be understood that modifications may be made and that no limitations upon the invention are intended other than are imposed by the scope of the appended claim.

Having now particularly described and ascertained the nature of my said invention and in what manner the same is to be performed I declare that what I claim is:

A system of secret radio telephony comprising a transmitter having a pair of frequency controlling circuits, variable tuning elements in said circuits, a driving motor for actuating said tuning elements for periodically changing the tuning of said circuits between definite limits for emitting signaling energy on varying frequencies between a higher and lower limit, a receiving system including a pair of frequency controlling circuits, variable tuning elements in said circuits, a second driving motor arranged to vary said last mentioned tuning elements in synchronism with said tuning elements at said transmitter, and a pair of circuits at said receiver each separately adjusted to the higher and lower limits of the frequency of said signaling energy for controlling the operation of said second driving motor for maintaining synchronism with the first mentioned driving motor at said transmitter.

In testimony whereof I affix my signature.

HANS SCHMIDT.