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Intellectual Property - 101

Peter Corcoran

This issue we have an interesting article on the co-inventors of the original wireless remote control (RC) technologies. This was inspired as a tribute to the recent passing of Eugene Polley.

Within CE Society we are lucky to have an IEEE Fellow and long-time volunteer within our society who worked with both Eugene and Robert Adler. Robert invented an alternative technology for wireless remote control at almost the same time. It is perhaps not surprising that there was occasional conflict between the two, but both made a significant contribution to CE technology at that time and this issue of CE Magazine is themed around their work.

As a compliment to our main article on the history and background to the original TV remote control I thought it would be interesting to investigate further the technologies behind both the Flashmatic (Polley) and the Space Command (Adler) remote controls.

The Flashmatic Patent - US 2,903,575

The original Flashmatic patent was filed May 6th 1955 and granted Sept 8 1959 to the Zenith Radio Corporation. Even in those days it took almost 4 years to work through the patent examination process to have a legally enforceable patent.

As with older patents the '575 patent is very clear about the described invention:

"It is a general object of this invention to provide a new and improved remote control system which is simple and economical and yet which affords versatility and accuracy of control and adjustment."

"It is a further object of the invention to provide a control system for a wave-signal receiver which may be actuated by means of a controllable light source; in other words, to provide a remote control system in which tuning or other characteristics are varied by means of a light beam."

In the same way, the essence of the patent can be very readily understood from Figure 1, reproduced below. And the original patent description is also quite apt:

"Figure 1 illustrates a television receiver ... remote control system comprises four photo-sensitive devices 17, 18, 19 and 20 mounted behind individual recessed openings in cabinet 11 around the periphery of viewing screen 12. The position of these devices ... is not critical but they should be spaced from each other by a sufficient distance to permit individual actuation.", and then:

"With the receiver in operation, flashlight 30 may be employed to direct a beam of light to impinge upon either of photocells 19 to turn the receiver off ... a second discrete impulse of light directed to photocell 19 from flashlight 30 may be employed to bring receiver 10 back into operation ... "

In the same way photocell 18 would rotate the tuner in the opposite direction and the fourth photocell 20 provided the very helpful "mute" function to disable the audio output. This last functionality was promoted at the time as enabling the user to avoid listening to annoying advertising - a precursor of the ad-skipping functionality of modern DVR systems!

Sept. 8, 1959

E. J. POLLEY
CONTROL SYSTEM

2,903,575

Filed May 6, 1955

3 Sheets-Sheet 1

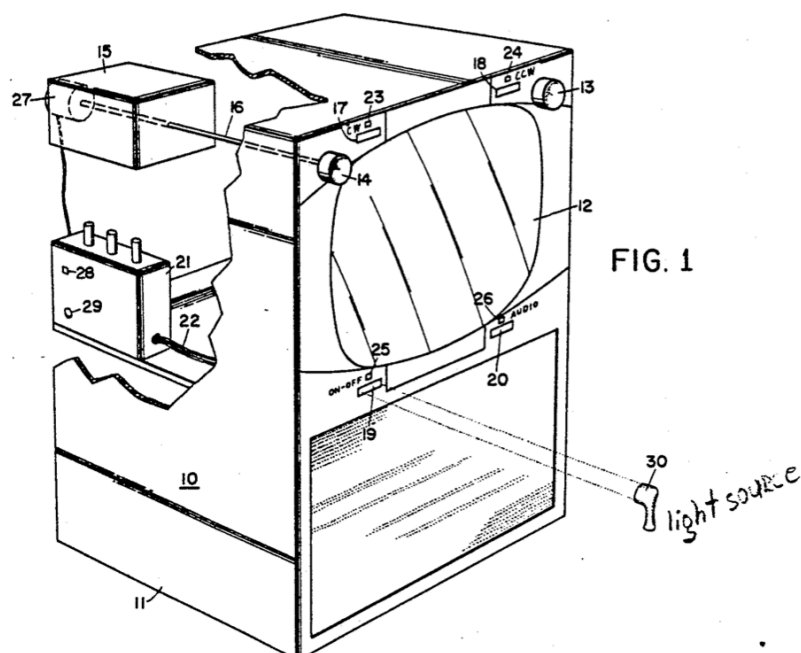


Figure 1: The Flashmatic System - note the 4 key photosensors: 17, 18, 19 and 20. [From US patent 2,903,575.]

The specification also mentions a number of older electronic technologies which may stir memories in some of our older readers. The system employed cadmium-sulfide photocells and type 2D21 four-electrode thyatrons¹.

A particular feature of the Flashmatic was that it could be used with any conventional flashlight. The system incorporated sensitivity tuning to enable the user to adjust the system so that it would not be triggered by ambient illumination. A more detailed description of all the system features can be found in the original

¹ Thyratrons were electrical switches, incorporating a gas-filled tube and a controlled rectifier. Because of the gas fill, thyratrons can handle much greater currents than similar hard vacuum tubes since the positive ions could carry considerable current. Gases used included mercury vapor, xenon, or neon. They were widely employed in early generation TV sets.

patent specification which is available in PDF format from the US patent office or other web based patent search systems. Note that a text version is not available for this patent because it is pre-1976.

United States Patent Office

2,903,575

Patented Sept. 8, 1959

1

2,903,575

CONTROL SYSTEM

Eugene J. Polley, Lombard, Ill., assignor to Zenith Radio Corporation, a corporation of Delaware

Application May 6, 1955, Serial No. 506,433

3 Claims. (Cl. 250—20)

This invention is directed to a new and improved control system for a wave-signal receiver. The control system is particularly useful in adjusting the operating characteristics of a television receiver, and will be described in that connection, although it may also be used with other types of receivers.

In the past, many different remote control arrangements have been proposed for both radio and television receivers, some of which have been exploited commercially. Most of these remote control systems require physical interconnection between a remote control station and the receiver, usually by a conductive wire or multi-conductor cable. Although some of these systems have been relatively convenient and effective in operation, they are always subject to the principal disadvantage that the wire or cable linking the remote control station to the receiver is not particularly attractive in appearance and may often cause accidents when laid across a portion of the floor where people must walk.

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signals, and a power supply circuit coupled to the selector and audio circuits and actuatable between two different power-translating conditions. The system includes first and second impedance means each having a substantial change in impedance value in response to a pulse of wave energy from a remote source together with means coupling the first impedance means to a station selector circuit and responsive to a change in impedance value of the first impedance means for selectively actuating that circuit between its different conditions. The system further includes means coupling the second impedance means to one of the audio and power supply circuits and responsive to a change in impedance value of the second impedance means for selectively actuating the one circuit between its different conditions. First and second adjustable impedance elements are coupled respectively in series combination with the first and second impedance means to form first and second networks respectively. A third adjustable impedance element is coupled in series combination with a source of electrical power to form a third network. Finally, the system includes means coupling the third network in series combination with a parallel combination of the first and second networks.

The features of the invention which are believed to be novel are set forth with particularity in the appended claims. The organization and manner of operation of the invention, together with further objects and advantages thereof, may best be understood by reference to the following description taken in conjunction with the accompanying drawings, in which like elements are identified by like numerals in each of the figures, and in which:

Figure 1 is a perspective view of a television receiver in which a control system constructed in accordance with

Figure 2: Extract from the cover page of Eugene's 1959 patent.

The Space Command Patent - US 2,817,025

There were in fact multiple patents filed around the ultrasonic system developed by Robert Adler. The original of these was filed on April 16 1956 and was followed by an improved filing on August 5 1957; these two original filings were eventually granted on December 17th 1957 as US 2,817,025. Interestingly this patent was granted at an earlier date than the Flashmatic patent which did not issue until 1959.

A key objective of the '025 patent was to overcome disadvantages of the prior art relating to *false-triggering* due to either ambient acoustic noise or lighting conditions. In particular, the earlier Flashmatic system had proved susceptible to false actuation due to lighting variations when, for example, direct sunlight would shine into a room.

The principle features of the Space Commander are illustrated in Figure 1 below. As it was based on acoustic signals the Receiver side of the system incorporates a microphone 32 and amplifier. Various signal processing and actuation circuitry is also shown in the block diagram of Figure 1.

FIG. 1

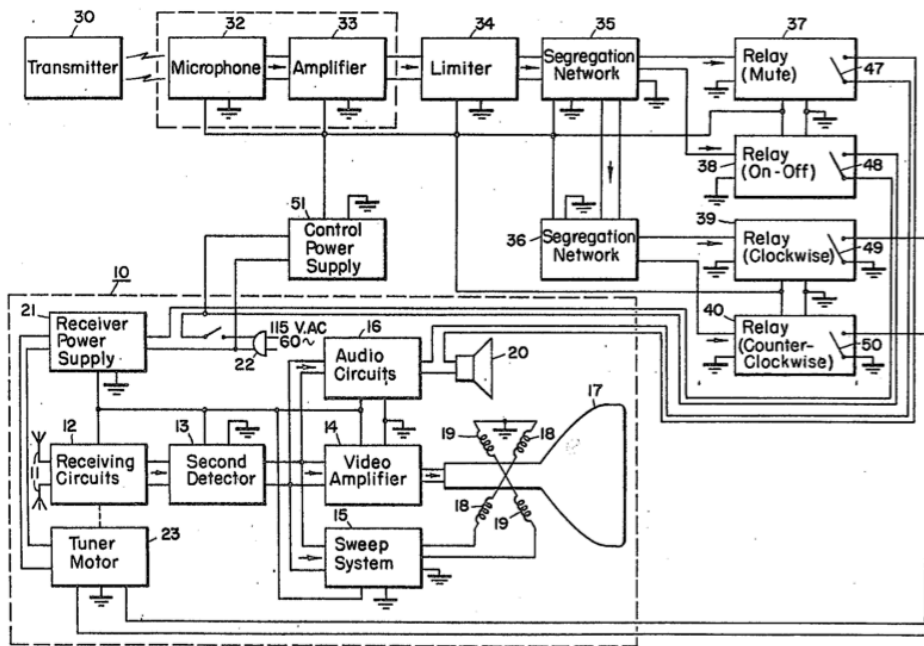


Figure 3: Main system diagram from Adler's 1957 patent.

Adler's system was based on determining ultrasonic resonances and was thus somewhat more complex than the relatively straightforward techniques employed by the Flashmatic system. In part he relied on another invention described in US patent 2,838,668 for an improved "Frequency Discrimination System". In simple terms this other invention provided a technique to ensure that the frequency ranges of the individual frequency discriminating circuits did not overlap.

It is important to remember that these system pre-date the age of modern electronics and this circuitry was based on arrangement of coils, capacitors and gas-tube or vacuum valves. Figure 4 illustrates typical signals at the receiver and the processed outputs for a coherent, resonant signal and a typical ambient noise signal.

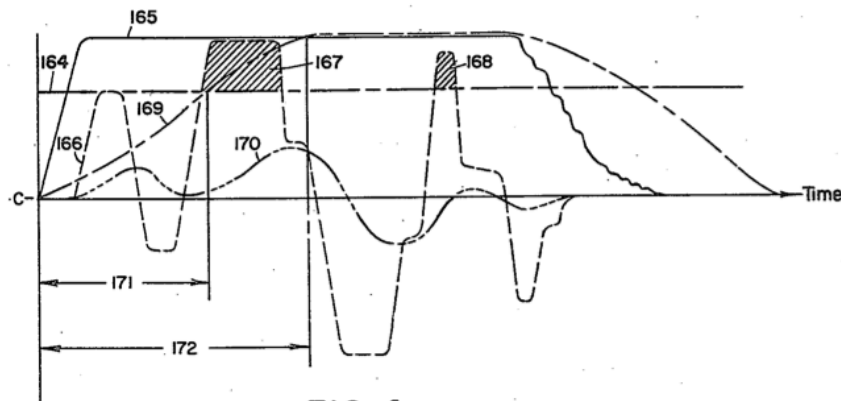


FIG. 4

ROBERT ADLER
INVENTOR.

BY *John J. Pederson*
HIS ATTORNEY.

Figure 4: Resonant triggering of the receiver; 169 represents the integrated signal 165 of discriminator circuit and achieves a voltage above triggering threshold 164; 170 represents the integrated noise signal 166 and does not exceed threshold 164 despite peak noise events 167 and 168; from Adler's 1957 patent.

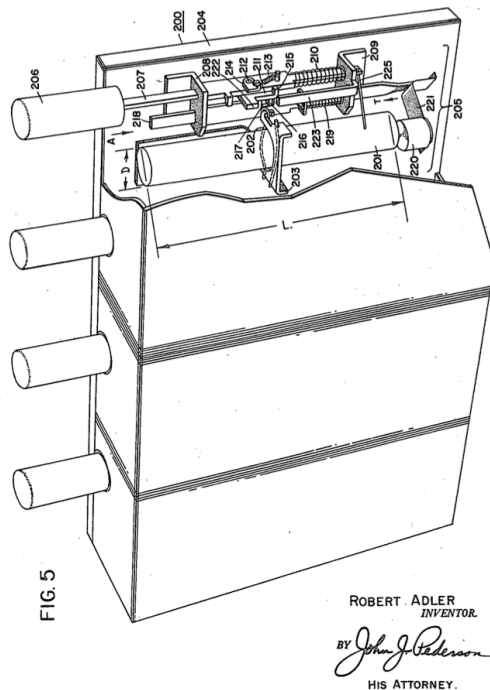


Figure 5: The transmitter unit from Adler's patent.

Figure 6 below. It represents an improved longitudinal mode resonator for the generation of an ultrasonic signal which is simple in construction and provides a holding means for the generator rod which has a minimal dampening effect on said resonator. This holding means includes a spring wire support with portions extending transversely about the vibrator element and retained within peripherally aligned grooves.

Concluding Thoughts

We can see from the above discussion that both Polley and Adler contributed ideas that led to the development of novel and highly innovative consumer electronic products for the late 1950s. At that time our industry was very much in its infancy and we see that these products were more electromechanical than electronic in nature.

It is clear that Adler's system was more sophisticated in nature, incorporating elements of signal processing at the receiver and an advanced, yet robust, ultrasonic generating mechanism within the transmitter module. His invention relies on several additional patented techniques that were available to Zenith at that time and is more

A further key aspect of Adler's invention is the transmitter. As explained by Adler: "... the remote control system is only as good as its transmitter, and it has been found that complexity and delicacy of construction are highly undesirable in this portion of the system. A preferred form of transmitter 200 for use in the remote control system of the invention is illustrated in Figure 5, in which complete details are give for only one section 205 of the transmitting apparatus inasmuch as the four sections required to actuate the receiver systems are identical except for their resonant frequencies."

The transmitter employs a series of vibrating rods whose lengths determine the corresponding resonant frequencies. Again for the core mechanism of the actuator for these rods, Adler relies on another patent assigned to Zenith, US 2,821,956 for an "Ultrasonic Generator" granted on Feb 4th 1958 to Ole Wold.

This is shown in

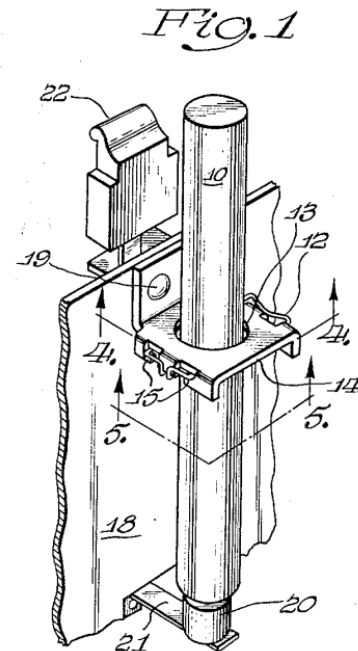
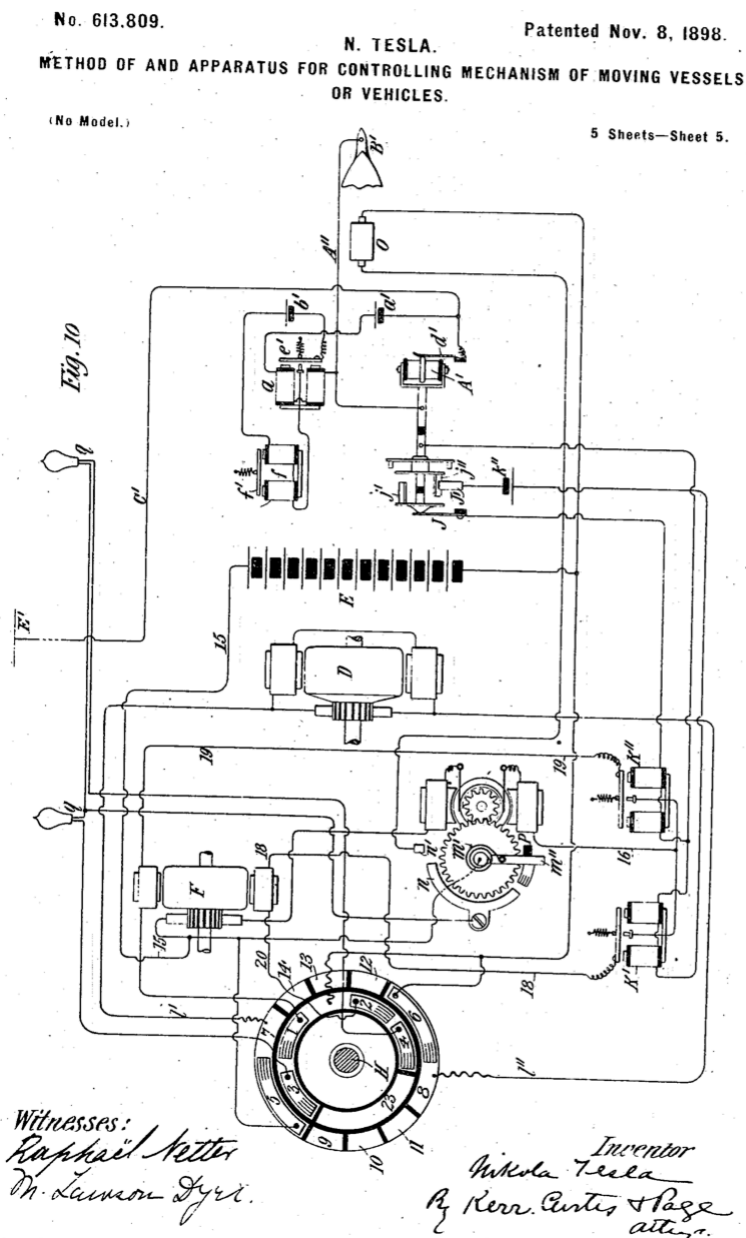


Figure 1 Ultrasonic Generator invented by Ole Wold, US Patent 2,821,956, Feb 1958.

representative of complex modern consumer product. It performed well in the market and several later enhancements to the underlying system were subsequently patented.

On the other hand Polley's invention is elegant and its simplicity is characteristic of many classic inventions. In practice it was unfortunately less reliable than Adler's system and was withdrawn from the market after only a few years.



As indicated in the introduction there was some conflict between Polley and Adler as to who was the true inventor of the modern remote control. Interestingly, while researching this article I unearthed a number of earlier technologies providing wireless remote control. Some of these patented techniques date back to the 19th century. The earliest dates back to July 1898 and describes a "Method and Apparatus for Controlling Mechanism of Moving Vessels or Vehicles". And the inventor? Well, perhaps not such a surprise, it was a certain Nikola Tesla!

Figure 7: Was Nikola Tesla the real "Father of the Remote Control?"