

The Detectorium

Radio News, vol. 8 no. 3

September 1926

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IN view of the growing popularity of the crystal detector, especially in our large cities, I believe that experimenters all over, particularly the new-comers, will be interested in an instrument invented by me in 1910. The Detectorium, as it was designated by me at that time, was patented June 21, 1910 (U. S. Patent No. 961,855).¹

During all the years since broadcasting has come into vogue, I do not recall having seen the device described; but it was so good in the old days, and performed so remarkably well, that I feel it my duty to bring it again to light. It was originally described in the world's first radio magazine, which I published; namely, "MODERN ELECTRICS," in the July, 1910, issue.²

The Detectorium is interesting chiefly because it does two things at once. Instead of first adjusting the detector and then tuning by means of switches or sliders, in the Detectorium these two operations are performed in one. As the illustration shows, *the detector has become the tuning slider*.

The great utility of a device of this kind will be seen immediately, particularly

¹Hugo Gernsback, "Detectorium," June 1910, <http://www.google.com/patents/US961855>.

²The Detectorium was sold by Electro Importing, fully assembled, for \$3.50 in 1913.

for sets that are to be transported a good deal.³

In my 1910 experiments I quickly found that the only good minerals were Silicon, Copper Pyrites, Iron Pyrites, Zincite, and Carborundum, in the order named.

A number of circuits showing Detectorium connections are shown on this page.

At this point I wish to say that I believe that our 1910 tuning coils with sliders are still way ahead of anything that is in use now. Very fine tuning can be done with a double-slide tuning coil; much better, in fact, than in most devices used today.

CONSTRUCTION IS EASY

The Detectorium can be readily constructed by an experimenter, and no particular directions need be given here as to sizes. The illustrations show a tuning



THE GERNSBACK DETECTORIUM.
Patented June 21, 1910.

This instrument is the outcome of 3 years work to produce an apparatus whereby the two most important instruments are combined into one: namely the Tuner and the Detector. The tuning is done by means of certain detector crystals acting as the slider on the bare convolutions of the Tuner.

Inasmuch as the relationship between Tuner and Detector is very close, it goes without saying that the combination of the two into one instrument, makes it extremely desirable from a scientific standpoint. The combination is vastly more advantageous than using the two instruments separately. The sensitiveness is also greater and the adjustment infinitely better. Instead of adjusting two instruments only one needs to be adjusted, thereby greatly increasing the efficiency.

It is not necessary to adjust the detector when sliding it from one point to another as would be thought, but once adjusted, the detector may be moved back and forward and it will positively not lose its adjustment.

The construction of this instrument is of the highest order, only the best material being used. Hard rubber ends, hard rubber binding posts, and our hard rubber sliders are used. The detector has a double spring (not shown in illustration) and a large adjusting screw, giving extremely fine adjustment. The instrument is made so carefully that the detector may be moved back and forward while a message is coming in and it is quite impossible to lose even a dot. A special feature is, that the cup holding the crystal is detachable by means of the handle below the large knob, and each Detectorium is furnished with one extra cup so that several crystals or minerals may be used and the exchange from one to another can be effected in less than five seconds.

We do not furnish any crystals or minerals with the Detectorium Outfit and leave it to the buyer to use any particular mineral or crystal he fancies. Mostly any of the regular crystals or minerals can be used to advantage except carborundum. Full directions are given with each instrument and we guarantee it fully in every respect.

On account of its great lightness and compactness, this instrument is especially desirable for portable outfits, aeroplanes, etc. Size over all 8"x3½"x3¼". Weight 1 lb., wave length is 600 meters, making it a good all-around instrument. Price \$3.50. By mail extra 35 cents.

(Ad of Electro Importing Co., NY NY) *Modern Electrics* (August 1913), p. 336

³In a handbook published by Gernsback's brother Sidney and other Electro Importing employees, one lesson is devoted to the construction of the Detectorium, recommending that a kite be used to lift the aerial to a sufficient height. They write that apparatus is

very well adapted to the requirements of all portable wireless stations, such as those in mule pack sets, aeroplane airship sets, and in a hundred other places, where light weight and great compactness are prime requisites. ... This method of using a loading coil is the only way by which so long a wave length may be obtained within such a limited space. Sidney Gernsback, Harry Winfield Secor, and Austin Celestin Lescarbours, *Experimental Electricity Course in Twenty Lessons*, (New York: The Experimenter Publishing Co., Inc., 1916), 62-3.

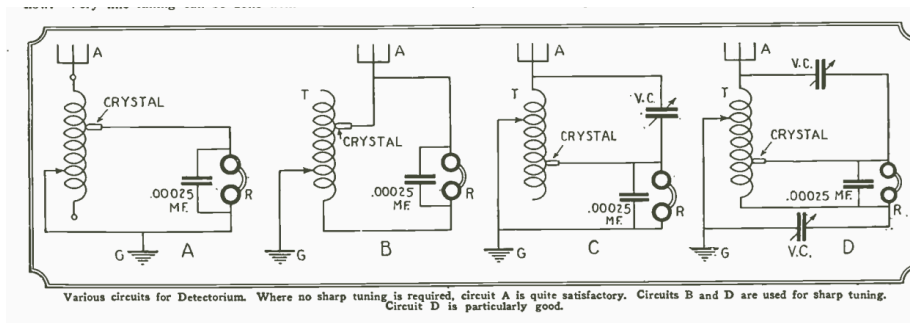


Figure 1: Various circuits for Detectorium. Where no sharp tuning is required, circuit A is quite satisfactory. Circuits B and D are used for sharp tuning. Circuit D is particularly good.

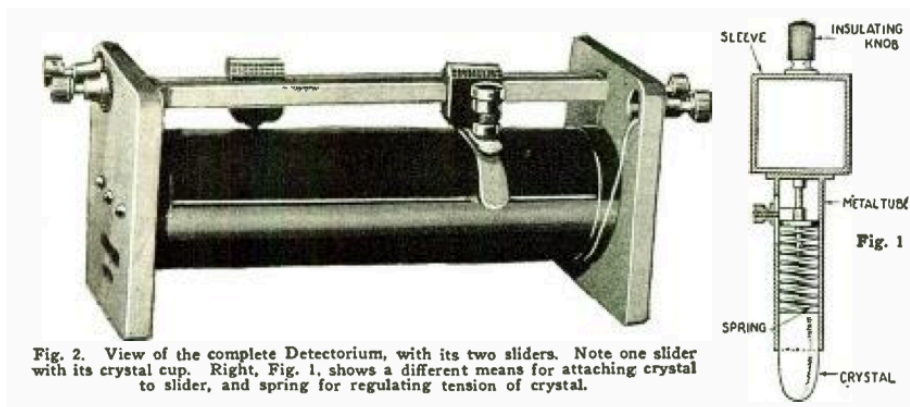


Figure 2: View of the complete detectorium, with its two sliders. Note one slider with its crystal cup. right, Fig. 1, shows a different means for attaching crystal to slider, and spring for regulating tension of crystal.

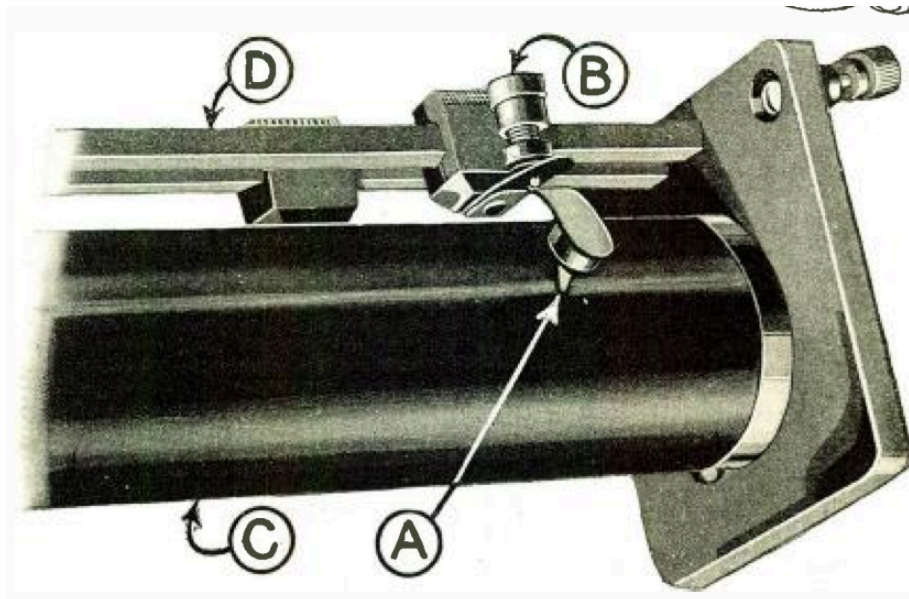


Figure 3: Close-up of Detectorium, showing D, slider, B, adjusting screw to bring crystal cup with crystal into contact with wire convolutions, A, crystal, and C, tuning coil.

coil which was common in 1910, but whose range is greater than the present broadcast range. The coil at that time consisted of a two-inch tube about eight inches long, wound with No. 24 enameled or bare wire. The same size tube can be used today, with the exception that the wire should be about No. 18 or No. 20 B & S bare copper, which will cover the broadcast range surprisingly well.

The tube is put in a lathe, or similar winding device, and bare copper wire is used, winding with it, at the same time, a thick thread, to separate the wire convolutions so that they do not touch. The thread can remain, if so desired.

A slider arrangement as shown in Fig. 1, can be used if desired, or otherwise the arrangement shown in Figs. 2 and 3, which was the better arrangement, can also be used. If the slider shown at Fig. 1 is used, it is necessary of a form somewhat as shown; that is, a bullet-like shape. The ends can be rounded off nicely by grounding on an enemy stone and afterwards polishing the crystal perfectly smooth. The end curvature should not be too small, otherwise two turns on the tuning inductance will be short-circuited.

The better way is shown in Figs. 2 and 3. The slider in this case may be a piece of wood with a square-filed hole. Contact is made with the slider rod by means of a small spiral spring, which presses against the metal screw B, which serves to vary the tension of the lower leaf spring, which carries the detector cup A. C represents the wire convolutions, D the second slider rod.

The detector cup A is a metal cup, in which the detector crystal is held by means of a fusible alloy. The part of the crystal making contact with the wire should not be sharp, but rounded off. If it is sharp it will scratch the wire and stick between the convolutions.

SIMPLE, SHARP, SATISFACTORY

If the Detectorium is constructed with care, a great amount of satisfaction can be had from it; because it places the detector right underneath one's finger, and tuning is done very rapidly. Particularly with silicon and iron pyrites, the tension adjustment is not very critical, and a little more or less pressure does not seem to make much difference, as reception is usually excellent in all cases.

The Detectorium is a most efficient instrument, because it does away with a number of extra parts and extra wires; and is therefore really a low-loss detector instrument. If carefully adjusted, it will be found that the Detectorium will surpass in loudness of reception almost any other crystal combination. Not only that, *but exceedingly sharp tuning can be done*, much sharper than you are accustomed to obtain with the usual crystal-detector arrangement.

The circuit diagrams, Figs. B and D, are excellent for sharp tuning; no value is given for the variable condensers, as this depends a great deal upon the construction of the Detectorium. .0005- μ f. condensers, however, are satisfactory in nearly all cases.⁴

In Figs. 2 and 3 the detector-bearing cup is shown soldered right to the lower leaf spring. If desired, the lower leaf spring may be slotted, and by means of a screw arrangement, different crystals screwed in or out if different sensitivities are desired. It is understood that the Detectorium uses no batteries of any kind, as the rectified current of the incoming wave is sufficient to operate the telephone receivers.

I shall be glad to hear from those who have constructed the Detectorium.⁵

⁴The farad is the standard unit for measuring electrical capacitance. It is named after Michael Faraday (1791-1876), the physicist who pioneered research in electromagnetism. A μ f denotes a microfarad, or one millionth of a farad.

⁵H. Catchpole from London, England reported in the February 1927 issue that he had success building the Detectorium using iron pyrite, and that the results were "louder than any crystal set I have made to date." W. M. Cos, EAA., Chatham, England, wrote in a letter, published in the December 1926 issue:

I constructed this instrument in 1918 when I first commenced radio research. Details were then published in your handbook, "Wireless Telegraph and Telephony." The instance remains vivid in my memory as the tuner, when incorporated in a portable set was extremely efficient and decidedly unique. The only trouble that I experienced was due to the crystal. Silicon was the most satisfactory although it has a tendency to crumble. This applies to zincite while carborundum cannot be ground and is therefore not smooth in action. The tuning was extremely sharp, and when the secondary was shunted by a .0003- μ f. variable condenser

results were all that could be desired. I take this opportunity to compliment you on the high standard of your publications, which with all due respect to our English periodicals, are on a much higher scientific basis. Our papers only cater to the broadcast listener, and the experimenter who dabbles in everything electrical is left in the dark.