1927
Jan. 10 to 25.
April 14.

CANADIAN GENERAL ELECTRIC COMPANY, LIMITED ..... } PLAINTIFF;

AND

FADA RADIO LIMITED..... DEFENDANT.

(No. 7026)

Patents—Subject-matter—Anticipation—Combination—Prior art—Specification—Disclosure

Held: That there must be a substantial exercise of the inventive power, though it may in some cases be very slight, to sustain a grant for a patent for invention. Slight alterations may produce important results and may disclose great ingenuity.

2. That in a combination apparatus, if the invention required independent thought, ingenuity and skill; produced in a distinctive form a more efficient result, converting a comparatively defective apparatus into a useful and efficient one, rejected what was bad and useless in former attempts and retained what was useful, uniting them all into an apparatus which taken as a whole was novel, such denoted invention. A new combination of well known devices and the application thereof to a new or useful purpose may require invention to produce it, and may be good subject matter for patent.

3. That in order to establish that a patent has been anticipated, any information as to the alleged invention given by any prior publication must, for the purpose of practical utility, be equal to that given by the subsequent patent. The latter invention must be described in the earlier publication that is held to anticipate it, in order to sustain the defence of anticipation.

(1) (1879) 4 P. 204.
(2) (1923) Ex. C.R. 167.
(3) (1922) 21 Ex. C.R. 398.
(4) (1919) P. 355.
(5) (1877) 69 N.Y.R. 470, (24 Sickels).
(6) (1872) 49 N.Y.R. 379, (4 Sickels).

4. Where the question is solely one of prior publication it is not enough to prove that an apparatus described in an earlier specification, could have been used to produce this or that result. It must also be shown that the specifications contain clear and unmistakable directions so to use it. It must be shown that the public have been so presented with the invention, that it is out of power of any subsequent person to claim the invention as his own.

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This was an action by plaintiff to restrain the defendant from infringing a certain patent granted to one Alexanderson and assigned to it. The patent in suit related to selective tuning systems in radio reception. The court found that the patent in suit was not to be found in the prior art, was not anticipated and disclosed invention.

The action was tried before the Honourable Mr. Justice Maclean, President of the Court, at Ottawa.

Russel S. Smart, K.C., and *J. C. Macfarlane* for plaintiff.

George F. Henderson, K.C., and *Wm. D. Herridge* for defendant.

The facts are stated in the reasons for judgment.

THE PRESIDENT, this 14th day of April, 1927, delivered judgment.

This is an action for infringement of Canadian patent no. *208,583*, issued to the plaintiff in February, 1921, the plaintiff's inventor being one Alexanderson, a consulting engineer of the General Electric Company of the United States. The principal defences are lack of invention and anticipation; but the validity of the issue of the patent is attacked upon the ground that the application for patent was made subsequent to the expiration of the period fixed therefor by the Patent Act.

Alexanderson describes his invention as relating to the selection of oscillations of a given wave length from mixed oscillations, and comprises systems suitable for tuning out interferences in radio telegraphy. Interference describes what occurs when one at the radio telephone receiver, hears signals from stations other than that desired. Signals arriving at any receiving antenna have an intensity which depends upon two things: the original intensity with which they were emitted, and the distance that the receiving station is from the sending station. One station wishing

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to hear another station must be able to pick out of the confusion of currents in the receiving antenna, the particular one desired. It may perhaps come from a somewhat distant station and be relatively feeble, while an undesired signal may come from a nearby and more powerful station, producing much greater current in the receiving antenna. The problem therefore is one of selection, and one of the most difficult problems is to select a feeble signal from a more powerful signal, particularly when the separation in wave length is slight. In practise the preliminary precaution in abating interference, is the use of different frequencies or wave lengths, by the different transmitting stations.

A few words might appropriately be said here as to the chief elements in a radio receiving circuit, their functions and their operation. An electric circuit is a conducting path through which a battery or generator may send an electric current. There are two kinds of electric currents, direct and alternating currents. A direct current is that which flows in a coil of wire when a battery is connected to the terminals of the coil, and flows in one direction only. An alternating current is one which reverses, or flows first in one direction and then in the other. The number of pulsations of the current in one direction in a second of time is called the frequency of the current, and in the case of radio currents this frequency is very high as compared with the currents used in power or lighting circuits. The function of a radio transmitter is to create a high frequency alternating current in the transmitting antenna. This in turn produces a wave which travels in space and cutting across the receiving antenna sets up in it a high frequency alternating current, corresponding to that created by the transmitter and of identical frequency. In radio telephony the voice is impressed upon the transmitted wave, which carries it to the receiving apparatus, which in turn transforms it back into audible sound. At the receiving station it is necessary to be able to eliminate all waves other than the desired wave. To achieve this, use is made of what is known as a tuned circuit, and the method of selecting electric currents of any one frequency is based upon electrical resonance or tuning. A tuned circuit consists of a coil of wire across the ends of which is connected a condenser,

consisting of two sets of plates. Such a combination of coil and condenser, possesses the inherent property of responding strongly to impulses of one particular frequency. This frequency is known as the resonant frequency of the system or circuit. If this resonant frequency of the receiving circuit is made to harmonize with the frequency of the incoming wave which it is desired to receive, the receiving apparatus is made less receptive to interfering waves of other frequencies. If one set of plates is now made movable or variable with respect to the other, which means altering the capacity of the condenser, the resonant frequency may be adjusted so as to correspond to the frequency of the desired wave, and thereby that wave will be received with the maximum of effect. The resonant frequency of a circuit may also be varied by changing the number of the turns of the coil, thus regulating the inductance, and from this we have the expression, " variable inductance," which one frequently encounters. In general practice the coil of the tuned circuit is one of two coils or inductances, constituting what is known as a transformer, the coils being associated closely together, so that if an alternating current is set up in the first or primary coil, it will induce a corresponding current in the second or secondary coil of the transformer. A vacuum tube or audion consists essentially of an evacuated envelope or tube containing three elements: first, a filament which is heated by a low voltage battery and which emits electrons or minute charges of electricity; second, a metal plate or anode; and last, a grid so arranged that the electrons emitted from the filament must pass through the grid in order to reach the plate. Connected between the filament and the plate is a high voltage battery which charges the plate or anode, thereby attracting to it the electrons emitted by the filament, and thus setting up a current in the tube and the associated plate circuit. The grid acts as a valve to control the flow of electrons in the tube, and is usually connected to one side of a receiving circuit, the other side being connected to the filament. The variations of voltage due to the received wave are thereby impressed upon the grid, and cause corresponding variations in the flow of electrons through the tube to the plate, and in the current through the associated plate circuit.

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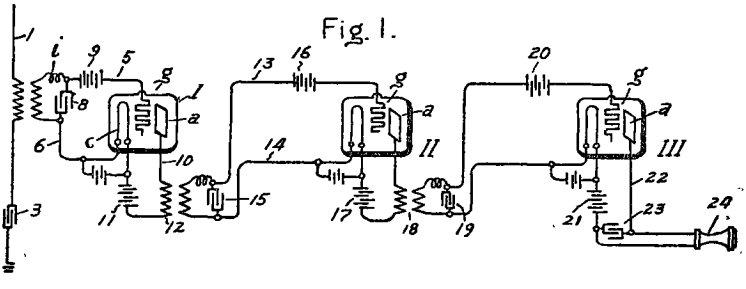
These variations of current are identical in character to the current in the antenna, but are very much stronger, and the result is that the antenna current is reproduced in the plate circuit in a magnified or amplified form. The human ear cannot respond to the higher or radio frequencies, and in order to render the signals carried by the radio wave audible to the ear, it is necessary to separate the low frequency of the voice or signal, from the high frequency of the radio wave, and the change is one from radio frequency to audio frequency. This is the function of a detector or rectifier, and the device usually employed for the purpose is a crystal or a vacuum tube. It should be observed however that when a vacuum tube is used as a detector, the manner in which the tube is operated is different from that when the tube is used as an amplifier.

Having generally described, no doubt with some inaccuracies, the principal elements of a tuned circuit, its purpose and operation in radio reception, I shall now turn to portions of the specifications and claims of Alexanderson, and allow the inventor to describe with greater accuracy and in greater detail his invention, the problem he claims to have solved, and his particular method of selective tuning, which he claims to be secured by the plurality of resonant circuits, arranged in cascade or series, and in such a manner that the selectivity of the system, that is the ability of the system to select the desired radio signals, increases in geometric ratio with the number of circuits employed.

Fig. 1 of the plaintiff's patent here shown will illustrate the circuits of Alexanderson's invention.



The problem which claimed the inventor's attention is described as follows:—

One of the chief problems encountered in radio-telegraphy is the suppression of waves of various wave lengths interfering with the waves con-

stituting the signal to be received. The method now commonly employed for this purpose consists in using an electric circuit in which a train of waves of a given frequency acts cumulatively so that each successive impulse adds its energy to the previous impulse, while disturbing impulses of a different frequency have little effect. However, to screen out strong disturbing impulses effectively when weak signals are to be received, requires an accuracy of adjustment which imposes a definite limit upon the possible selectivity of the system.

He then proceeds to describe how he secures an improved method of selective tuning:—

In accordance with the present invention, selective tuning is secured by the use of a plurality of resonant circuits arranged in cascade in such a manner that the selectivity of the system increases in geometric ratio with the number of circuits employed. The selective circuits are respectively interlinked by a relay controlling a separate source of energy to initiate oscillations corresponding to potential oscillations impressed upon the relay. As each tuned circuit is more or less opaque to disturbing oscillations differing in frequency from the oscillations to be selected, a certain percentage of the disturbances is eliminated in each circuit of the series, so that the purity of the incoming train of oscillations progressively increases as it is successively relayed. The relay preferably used for this purpose is an electron discharge tube having an incandescent cathode, an anode and a grid.

After describing the drawings illustrative of his circuits, he gives a description of the operation of the first circuit, which will sufficiently describe for the present purposes his drawings illustrating that circuit, in fig. 1. That is as follows:—

As the incoming oscillations are received by a resonant circuit tuned to the particular frequency of the signals which are to be received, the effect of disturbing waves having a different frequency is suppressed to an extent dependent upon the tuning of the circuit. Because of its resistance and special distribution the antenna circuit cannot be closely tuned, so that the suppression of interference in this circuit may be disregarded in the present case. However, the waves of various frequencies picked up by the antenna are transferred by the transformer 2 to a resonant circuit 5, 6, the inductance and capacity of which may be closely adjusted so that the oscillations having the desired frequency have a maximum effect whereas the effect of wave impulses having a different frequency is suppressed to say, for example one-tenth their original value. The resulting voltage oscillations are superimposed upon the definite negative potential maintained upon the grid of the electron discharge tube by battery 9, and this varies the conductivity between the cathode *c* and the anode *a* in accordance with the variations of voltage. Preferably the negative terminal of the battery 9 is connected to the grid. The battery 11 sends through the plate circuit 10 a variable current, the oscillations of which are in step with the oscillations in the resonant circuit, 5, 6.

Alexanderson then proceeds to state that the oscillations are transferred by a transformer *12* to the second resonant circuit *13, 14,* tuned to the desired frequency, and he states

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that if the disturbing oscillations are here suppressed one-tenth, they will have been reduced to one hundredth of their original effect when received by the antenna circuit. For the third tuned circuit he claims the same beneficial results, the disturbances being reduced to one thousandth of their original value. He states that if desired the size of the battery in this circuit may be so arranged as to magnify the effect of the oscillations, now practically free from disturbances, and so may be readily distinguished by the telephone receiver. In the same manner other tuned circuits may be added, and the disturbing impulses suppressed in the same degree.

Claims 3 and 7 are typical of the others:

3. A tuned circuit receiving system for detecting sustained oscillations of a given frequency comprising a plurality of circuits resonant to the frequency of the oscillations to be detected and arranged in cascade, relay devices joining each of said circuits to another comprising an evacuated envelope, an electron-emitting cathode, a co-operating anode, and a grid, said devices being connected to one of said circuits at the cathode and grid and to another circuit at the cathode and anode and a local source of energy in the second circuit.

7. The combination of a resonant circuit containing, an inductance and a condenser, an incandescent cathode relay having its grid circuit connected to the terminals of said condenser, a source of energy connected to the electrode circuit of said relay, and a second circuit resonant to the same frequency as the first resonant circuit supplied with current from the relay electrode circuit.

The defendant contends that Alexanderson is void for want of invention and that it has been anticipated. It might be convenient and appropriate at this stage to consider what principles are applicable, in reaching a determination upon these two defences. As to the first point, it is necessary to consider what is required in the way of invention to sustain the patent. Broadly stated the alleged invention must be new and useful, that is the statutory requirement, and it is always a question of fact if any patent fulfills those requirements. There must be a substantial exercise of the inventive power or inventive genius, though it may in cases be very slight. Slight alterations or improvements may produce important results, and may disclose great ingenuity. Sometimes it is a combination that is the invention; if the invention requires independent thought, ingenuity and skill, producing in a distinctive form a more efficient result, converting a comparatively defective

apparatus into a useful and efficient one, rejecting what is bad and useless in former attempts and retaining what is useful, and uniting them all into an apparatus which taken as a whole is novel, there is subject matter. A new combination of well known devices, and the application thereof to a new and useful purpose may require invention to produce it, and may be good subject matter for a patent. Then as to the question of anticipation. Any information as to the alleged invention given by any prior publication must be for the purpose of practical utility equal to that given by the subsequent patent. The latter invention must be described in the earlier publication that is held to anticipate it, in order to sustain the defence of anticipation. Where the question is solely one of prior publication, it is not enough to prove that an apparatus described in an earlier specification, could have been used to produce this or that result. It must also be shown that the specifications contain clear and unmistakable direction so to use it. It must be shown that the public have been so presented with the invention, that it is out of the power of any subsequent person to claim the invention as his own. *Hills* v. *Evans* (1); *Otto* v. *Linford* (2); *Flour Oxidizing Co.* v. *Carr* (3); *Armstrong Whitworth Co. Ltd.* v. *Hardcastle* (4). It then is to be considered if the cited prior art, considered in the light of such principles, anticipated Alexanderson, and if not, whether Alexanderson itself discloses that degree of invention necessary to sustain a patent.

Several prior patents were cited by the defendant in support of its plea of anticipation. I shall first refer to the group of Marconi patents, and Stone, because they are similar in that they introduce a plurality of circuits inductively coupled. By means of a plurality of resonant circuits, inductively coupled, Marconi and Stone it is conceded may obtain a high degree of selectivity, but in practice it is said that this degree of selectivity, owing to the reaction of the circuits on one another or the transference of energy from the second circuit to the first, is obtained only at the expense of signal strength, and which signal

(1) (1862) 31 L.J. Ch. 457.
(2) (1882) 46 L.T.R. 35.
(3) (1908) 25 R.P.C. 428 at 457.
(4) (1925) 42 R.P.C. 543 at p. 555.

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strength diminishes from circuit to circuit. This reactive effect of Marconi and Stone may be reduced in magnitude, by loosening the coupling between the coils, but as the coupling is loosened the electrical oscillations diminish in strength, in which case one may have a high degree of selectivity but with a considerable loss of signal strength; if close coupling is employed, increased signal strength is obtained, but the reaction between the circuits is increased and this impairs the degree of selectivity of the arrangement. With such circuits as Marconi and Stone, a high degree of selectivity is therefore only attained at the expense of signal strength. The evidence abundantly supports that proposition, in fact I think it is admitted. In the Marconi and Franklin multiple tuner, British patent no. *12,960* (1907) a compromise is attempted between these neutralizing factors with a view of maintaining a fair degree of selectivity, whilst retaining a workable signal strength, by taking the same cascade of resonant circuits and coupling them inductively. It might be worth while to quote from the specifications of this patent, as it will probably make more intelligible what I have just been attempting to state:

> It is well known that if an instrument sensitive to the electric oscillations used in wireless telegraphy (hereinafter called a "receiver") be placed in a closed circuit inductively coupled to an aerial circuit and if both circuits be put in resonance with (that is to say be adjusted to have the same natural frequency of oscillation as) the received wave, the looser the coupling between the circuits the freer is the receiver from interference by waves of other lengths. Similarly if an aerial circuit be inductively coupled with a closed intermediate circuit and this intermediate circuit be inductively coupled with a closed circuit containing a receiver, and all three circuits be put in resonance with the received wave, the receiver is still more free from interference by waves of other lengths and this freedom is further increased by decreasing either of the couplings between the circuits. Increasing the number of circuits and decreasing the couplings between the circuits increases the freedom of the receiver from interference, but at the same time decreases the strength of the signals in the receiver; it is however found that in an instrument containing an aerial circuit, an intermediate circuit and a receiver circuit such as described above great freedom from interference without great loss in the strength of the signals is obtained by making the two couplings simultaneously and equally variable, etc.

This portion of the specifications seems to admit that even with the suggested circuit arrangement, there is still a loss of signal strength, and I think there is also the general implication therefrom, that for the purposes of obtaining

freedom from interference, the circuit proposed had inherent limitations, and that only a limited improvement in selectivity was expected from such circuit arrangement. Alexanderson, by means of a high frequency one way relay, a vacuum tube, which due to its amplifying properties not only prevents any loss of strength in the oscillations from circuit to circuit, but permits of an amplification of the same, obtains a high degree of selectivity without any appreciable loss of signal strength. Alexanderson is not limited to two or three circuits, as are Marconi and Stone by reason of the progressive loss in strength of oscillations, but he may use any number of circuits with corresponding improvement in selectivity, as the number of circuits is increased, and without loss of signal strength. It seems therefore to me that in substituting the vacuum tube as a high frequency one way relay coupling for the inductive coupling of Marconi and Stone, Alexanderson found means of transferring oscillations from one circuit to the next circuit, without any reactive effects between the circuits. In other words he found means of obtaining the highest degree of selectivity that Marconi or Stone could theoretically obtain, but without losing signal strength. It has been contended that the selectivity attainable by Marconi or Stone approached the selectivity of Alexanderson only when the signal strength of the former approached zero, and that may be so, but it is not necessary that I should express an opinion upon a point so technical. Alexanderson I think disclosed an arrangement that neither Marconi or Stone had suggested, and therefore it is my opinion that Marconi and Stone are not at all anticipations of Alexanderson.

The next prior art to be considered are three patents granted to the joint inventors, Schloemilch and Von Bronk, being German patents nos. *271,059* and *293,300*, issued in 1911 and 1913 respectively, and United States patent no. *1,087,892* issued in February, 1914. These patents are much relied upon by the defendant, and I think are the most important of any of the suggested anticipations, and I understood them to be treated on that footing by Mr. Henderson, defendant's counsel. They therefore demand a careful consideration. If anticipation of Alexanderson is not to be found in this series of patents, I do not think it can be found in any other of the prior art cited by the defendant.

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First, a broad and general consideration of those patents. The chief purpose of Schloemilch and Von Bronk throughout is amplification of electrical oscillations. The inventors perceived the amplifying properties of the vacuum tube, which they say had previously been used only as a detector. They contemplated the use of the vacuum tube as an amplifier, both before and after detection, or in other words at radio frequency and at audio frequency. The first mentioned patent refers to radio amplification, the second to audio amplification, and the last one, the United States patent, to both radio and audio amplification. In fig. 3 of the drawings of the United States patent, there is shown a vacuum tube to amplify the received oscillations, a detector to rectify them, and following this a second vacuum tube to amplify the resulting audio frequency oscillations or signals. Tuning is specifically shown only in the antenna circuit, and in the intermediate circuit or the circuit *n* inductively coupled with the output of the first tube. In none of the drawings of all these patents is more tuning shown than this, in some of them less, in one of them none at all. This, however, is subject to the qualification that the antenna is in all cases shown as tuned. And it is to be observed that in neither the specifications or claims of these three patents do the inventors make any reference whatever to tuned circuits for the purpose of attaining selectivity. If selectivity was the end to be achieved it is remarkable that it was not mentioned. Their minds were not evidently directed to this problem, and as a natural consequence they are silent upon it. They were apparently thinking in terms of amplification and not selectivity. In referring to the arrangement shown in fig. 3 (U.S.A.), Schloemilch and Von Bronk express a preference that the intermediate circuit *n* between the radio frequency amplifying vacuum tube and the detector, be tuned or "syntonised" as they say, and that circuit is shown in that figure as tuned by means of a variable condenser. The antenna circuit is shown in the drawings as tuned though no reference to this is made in the specifications or claims, but no suggestion is made as to tuning the secondary of the transformer *g* which couples the antenna with the first tube. The other drawings of this patent do not suggest any tuning at this stage. It may be that the effect of the tuning of the intermediate circuit

would result in an improvement in signal strength, and a gain or improvement in selectivity, but this is not mentioned in the specifications or claims. The dominant idea heralded throughout the specifications and claims is amplification; they claim the use of the vacuum tube as an amplifying relay but they are entirely silent as to selectivity. At all times of course, in the radio art, any means of receiving electrical oscillations would in some degree be selective means, or the receiving apparatus would be of little value or perhaps none. Upon a broad construction of these patents alone, there would not appear sound reasons for concluding that the inventors intended to refer to the same subject matter as Alexanderson, or that any one of the same was an anticipation of the latter.

Now for a more critical and detailed examination of these patents. Evidence was taken in this cause under commission, in Germany, where the joint inventors Schloemilch and Von Bronk, each gave evidence, and this evidence in relation to the question of anticipation must be considered with some care. As I have already indicated, the substantial controversy upon the defence of anticipation relates I think to the question, as to whether or not Alexanderson was anticipated by the Schloemilch and Von Bronk patents, and that in turn largely revolves around the point, as to whether the circuits disclosed in Schloemilch and Von Bronk were tuned or intended to be tuned as in Alexanderson, and for the purpose of selectivity. The importance of that point will perhaps appear more clearly when I say, that it is contended by the plaintiff, that it is not possible to obtain geometric selectivity unless all circuits are tuned to the same frequency, and so far as I can see that is a correct statement of fact.

In respect of German patent no. *271,059* where the antenna only is tuned, and which was common practice, Von Bronk states definitely that this patent was developed by himself alone, and that no tuning of the grid circuit of the tube was contemplated, and the drawings themselves are conclusive upon the point. This patent may therefore be put aside as not being in anticipation of Alexanderson. Remembering now, that no tuning is shown in the input circuit of the first tube of the German patent no. *293,300,*

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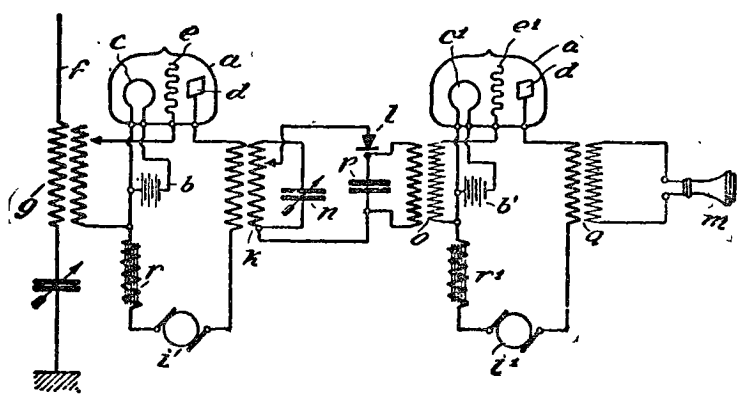
which is declared to be an improvement of German patent no. *271,059*, or in the same circuit of the United States patent, and remembering that it is contended by the defendant that tuning of this input circuit was common knowledge at the time and should be considered as expressed in the specifications of this patent, the plaintiff contesting this contention, I now proceed to a consideration of the evidence of the German inventors upon this point. It might be useful to insert here fig. 3 of the United States patent, granted to Schloemilch and Von Bronk.

Fig. 3.



In respect of German patent no. *293,300*, Schloemilch states that tuning of the antenna circuit, the grid circuit, and the output circuit, was practised by him and was obvious, but he is indefinite as to time, and he only affirms that it was prior to February 9, 1913. In support of Schloemilch's evidence, a blue print was introduced in evidence bearing the date of February 8, 1913, which turns out to be the day prior to the filing of the application for this German patent. There is nothing upon the blue print particularly associating it with the patent in question. Fig. 6 shows a tuned antenna circuit and also the grid circuit tuned by a variable condenser, and it is because of this latter fact, that the blue print is said to be of importance. Von Bronk's evidence as to the blue print and to the arrangement of circuits there disclosed, is indefinite, altogether negative, and consequently of no assistance upon the point. Schloemilch seems to have done all the work on this patent, and

it is not strange that the evidence of Von Bronk, in determining what Schloemilch had in mind in respect of tuned circuits, is of little or no assistance here. Schloemilch states that he communicated his experiments in connection with this patent to one Graf Arco, but there is no precise evidence as to when this was done, and Graf Arco was not called to corroborate this testimony. Fig. 1 of the drawings accompanying German patent no. *293,300,* indicates circuits giving both radio and audio amplification, although the claims of the patent only refer to audio amplification. Radio amplification having already been claimed in German patent no. *271,059,* the principal patent as it is called in the later German patent, it is clear why radio amplification was not claimed in the latter. When they both are put together in the United States patent, they do bear a physical resemblance to Alexanderson, except that the grid circuit of the first tube is not tuned. Now Schloemilch states that he always tuned the grid circuit, and that it was obvious and known to the art at the time. In the evidence, there is only his own testimony in support of this contention. Let me now refer to the documentary evidence, the patents and drawings, in order to see whether evidence may be found there in support of this contention. In fig. 3 of the United States patent, the secondary of the transformer *k* forming part of the intermediate circuit *n,* which the specifications say it is preferable to have tuned, is shown with a variable condenser across its terminals for tuning purposes. In fig. 6 of the blue print the secondary of the antenna transformer is tuned by means of a variable condenser. The condenser was therefore known to Schloemilch, and he makes use of it for some purpose or other. Now it is suggested that certain arrows shown in certain of the drawings indicate their use for tuning purposes. The arrows shown in the connection of the secondary of the transformer *k* to the detector 1, in fig. 3 of the United States patent, and in fig. 1 of the later German patent, is obviously a tap to control the voltage communicated to the detecting device, there being a variable condenser shown in that circuit, and both would not be required for tuning purposes. It is reasonable to assume that the arrows shown on the secondary of the transformer *g* of the United States

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patent and of the German patent, fulfill the same function, that of providing means for the control of the voltage impressed on the grid element *e* of the vacuum tube *a*, and has nothing to do with tuning. Von Bronk said timidly that the variable coil, controlled by the tap, was used for coupling or tuning purposes, but he did not profess to know what Schloemilch had in mind in regard to it. Schloemilch referring to the circuit *k. n.* stated, as I understand it, that the arrow indicated a coupling between the detector and the secondary of the transformer *k.* to obtain loose coupling and thus prevent excessive damping of the circuit, which would happen he said if the detector were coupled parallel to the entire circuit. Nowhere in the specifications of any of these three mentioned patents, is there to be found any suggestion that the arrows are used to indicate tuning, in fact, their presence or purpose in the drawings is not explained in the specifications. It appears therefore that the inventors when wishing to show a tuned circuit, show a variable condenser, and when they wished to show a voltage tap, they do so by means of an arrow. It would seem quite clear therefore that the arrows shown in the drawings of the German patent no. *293,300,* in fig. 3 of the United States patent, and in fig. 6 of the blue print, were intended to indicate voltage taps and not means of tuning. If it had been intended to tune the secondary circuit of the transformer *g* for the purposes of selectivity, I have no doubt they would have shown a variable condenser connected across it.

In respect of the evidences taken in Germany I am of the opinion that it does not support the contention, that tuning of the first grid circuit of patent no. *293,300* was contemplated. If the blue print were clearly shown to be made contemporaneously with the drawings of the patent under discussion, intended to be associated with them, and evidence of the inventors minds, omission to show tuning of the grid circuit of the first tube in the drawings of the patents themselves as already mentioned, seems to me convincing evidence that the inventors had not in mind selectivity at all, at least not of the order Alexanderson had in mind, and to attain which the tuning of every circuit was essential. It is as reasonable to say that the condenser

shown on the blue print across the secondary of the transformer in the antenna circuit, was discarded in the patent drawings because found unnecessary or useless in the arrangement or apparatus the inventors had in mind, as it is to say, that being shown on the blue print it should be assumed to be shown in the patent drawings. I am not impressed with the evidence of Schloemilch that it was omitted in order to simplify the patent drawings, if selectivity was what the inventors had in mind. I am satisfied that Schloemilch and Von Bronk were after signal strength rather than improved selectivity, and accordingly they accentuated amplification, while on the other hand Alexanderson, seeking selectivity of a high order accentuated tuning and the one way relay, the vacuum tube. Evidence given for the purpose of supporting the plea of anticipation of Alexanderson by Schloemilch and Von Bronk, should not receive much encouragement as against the former patent which has gone into general and successful use, unless it be of a much more convincing character than that presently under review I do not think it can be successfully or reasonably urged, that Schloemilch and Von Bronk describe Alexanderson, or that the former gave the latter to the public. There can be no doubt that early in 1913, Alexanderson had a clear scientific comprehension of the theory of selectivity in geometrical progression, and he then had in his mind means or instrumentalities by which he believed he could accomplish that end, and all this he communicated to others. In time, and in collaboration with others, he worked out a practical realization of his theoretical selectivity in geometrical ratio, in the production of a commercial apparatus, capable of producing the results he earlier predicted. There can be no doubt as to what he had hoped to accomplish, the means he had in mind for doing so, and that he did accomplish that end and by that means. If Schloemilch and Von Bronk had in mind an improved selectivity and the means of bringing this about, then their specifications did not communicate the idea, nor did they describe as they were bound to do, how their arrangement could be operated for purposes of selectivity if that was in their minds, and their evidence singularly lacks clarity in shewing all this. Upon that evidence and the

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patents themselves, I feel warranted in resolving every doubt against Schloemilch and Von Bronk. I am of the opinion that the Schloemilch and Von Bronk patents are not anticipations of Alexanderson. That being so it is unnecessary for me to deal with the precise dates of invention alleged by the respective inventors of these several patents, that is Alexanderson, and the three mentioned patents of Schloemilch and Von Bronk.

It now remains to consider whether Alexanderson possesses subject matter, and falls within any of the principles I have elsewhere mentioned as requisite to sustain a patent. I do not understand it to be seriously contested that Alexanderson does not possess utility, and it has not at least in my opinion been successfully attacked upon that ground. Alexanderson obtained radio frequency selectivity in geometric progression without loss of signal strength, and this was at that time I think a very substantial improvement over anything previously known. The system or arrangement of circuits there disclosed is capable of selecting a weak signal of one frequency, from stronger signals of another frequency, and at the same time amplify it. Upon the lowest ground it is a new and useful improvement over what was previously known to the art, and that is sufficient to support a patent. He disclosed a workable arrangement, and as Dr. Langmuir one of the plaintiff's witnesses put it, Alexanderson's proposal gave a new order of magnitude of selectivity, while in the prior art there was selectivity only in the sense that simple tuned circuits were used. I cannot escape the force of the fact, that the general acceptance and adoption in the art of the Alexanderson system is evidence confirmatory of novelty and utility, although of course it is not conclusive. Professor Hazeltine in his evidence discussing one of the Schloemilch and Von Bronk patents, stated that it was "the first embodiment of the arrangement which Alexanderson believed that he invented," and he stated, that was a radio frequency system having a vacuum tube type of relay, and attaining geometric selectivity by having a tuned input circuit and a tuned output circuit. If then Schloemilch and Von Bronk had not a tuned input circuit, and I think it had not, then Alexanderson, on Professor Hazeltine's own statement, was

the first inventor of the system which Professor Hazeltine described. Further, Professor Hazeltine admitted that the conditions of selectivity disclosed in the Alexanderson patent could be obtained by the circuit there shown, but he said, if one in addition wanted amplification and the full advantage of amplification, one would need to add something to it. It is not I think necessary to inquire what was in the mind of Professor Hazeltine as the requirement for a more complete amplification, for if the result claimed by Alexanderson may be obtained, then the utility claimed is admitted, and there is only the claim of novelty to be established to sustain the patent. Having reached the conclusion that this result was not disclosed in or recoverable from any of the prior art, then I am of the opinion that Alexanderson was the first to achieve the result he claims, and that his patent possesses novelty. Alexanderson claimed radio frequency selectivity in geometric progression without loss of signal strength, and he also states in his specifications that if it was desired to magnify the oscillations the battery might be so chosen so as to obtain greater amplification. It is admitted that the prior art disclosed devices by which selectivity in radio frequency could be obtained, and other devices disclosed methods for obtaining amplification of radio frequency currents, but it is claimed and correctly I think, that Alexanderson was the first to assemble the instrumentalities which furnished means for providing both selectivity, which progressively improved from circuit to circuit, and amplification at radio frequencies, in one device. As I pointed out in my discussion of the defence of anticipation, one may have a succession of tuned circuits inductively coupled giving progressive selectivity, but at such a loss of signal strength that it would not be practical for the purpose of obtaining the maximum of selectivity. It is quite true that up to a certain stage, the reduction of the signal strength may be prevented from falling below the range where it may be elevated by audio frequency amplification. It is claimed by the plaintiff however, and so far as I can see with force, that when one must stop short in obtaining selectivity to avoid loss of signal strength, the selectivity obtained is of a different magnitude from that obtainable from the Alexanderson arrangement, where

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one may proceed from two tuned circuits to any number without loss of signal strength, because the vacuum tube relay, coupling the circuits together at each stage, brings the signal up to its original strength. It is particularly the vacuum tube element which prevents the signal strength from falling and which also admits of amplification, and it is this which gives what is described as geometric selectivity by Alexanderson, and it is the feature distinguishing it from the prior art. The patent in suit is a particular arrangement of essential parts of a radio reception apparatus, which arrangement has advantages, and has been found practicable when carried out in the manner described in the specifications. Alexanderson may represent but a short forward step in the progressive radio art, but I conclude that what he did do was new and useful, produced new and important results and consequences, and required that substantial degree of inventive power, and skill in the art, which warrants me in holding that his patent possesses subject matter and should be upheld.

Granting that Alexanderson has subject matter and has not been anticipated, there is no doubt I think but that the defendant has infringed Alexanderson. In fact I do not understand that to have been seriously contested.

There now remains but one more point for consideration. Alexanderson applied for a patent in the United States on October 29, 1913, and a patent issued to him in that country on February 22, 1916. According to the provisions of the Patent Act, Alexanderson therefore should have filed his application for patent in Canada on or before February 22, 1917, or within one year after the date of the issue of his patent in the United States. It was not, however, until September 17, 1920, that he filed his application in Canada, and a patent issued on January 15 of the following year. It is therefore contended by the defendant, that the patent issued to Alexanderson in Canada is void by reason of the fact that the application for the same was not made in Canada on or before February 22, 1917, as required by the Patent Act. If this view is well founded, it is of course the end of Alexanderson so far as his Canadian patent is concerned. The plaintiff on the other hand contends that the application filed in Canada was within

the period fixed by chapter 44, sec. 7 (1) of the Statutes of Canada, 1921, post war legislation regarding patents, and which enacts as follows:—

7. (1) A patent shall not be refused on an application filed between the first day of August, 1914, and the expiration of a period of six months from the coming into force of this Act, nor shall a patent granted on such application be held invalid by reason of the invention having been patented in any other country or in any other of His Majesty's Dominions or Possessions or described in any printed publication or because it was in public use or on sale prior to the filing of the application, unless such patent or publication or such public use or sale was issued or made prior to the first day of August, 1913.

The same point, in analogous circumstances, was raised in a cause tried before me between the parties herein, immediately following the trial of the cause now under consideration, and I there held, that the application and the patent issued thereon was valid by virtue of the provisions of the statute to which I have just referred. I do not think therefore that it is necessary for me to engage in a prolonged discussion of this point in this cause, and I would refer to my reasons for judgment given in the other cause mentioned and which is numbered 7244 in the records of this court. I am therefore of the opinion that this defence fails, and that the plaintiff's application for patent and the patent granted thereon, is in this respect, within the provisions of the statute.

The plaintiff succeeds therefore in its action for infringement and is entitled to the usual relief, and also its costs of action. The counter-claim is dismissed.

Judgment accordingly.

Solicitors for plaintiff: *MacFarlane & Thompson.*

Solicitors for defendant: *Henderson & Herridge.*