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PLEASE ADDRESS ALL COMMUNICATIONS TO THE COMPANY

103

Marconi Wireless Telegraph Company of America

CODES
MARCONI
WESTERN UNION AND A.B.C.
RADIO & CABLE ADDRESS
"INOGRAM"

WOOLWORTH BUILDING
233 BROADWAY

TELEPHONE
BARCLAY 7610
(FIVE LINES)

New York February 3, 1914.

G. Marconi, Esq., LLD., DSc.,
Marconi House, Strand,
London, W. C.

My dear Mr. Marconi:-

Mr. Sammis is at the present time absent on the Pacific Coast on business and I therefore take it upon myself to acknowledge receipt of your favor of Jan. 22nd, written to us in answer to a letter addressed by Mr. Sammis and dated January 15th in regard to experiments and results made at Professor Pupin's laboratory, and we thank you very much for the information which you give us in your letter and which will be placed before Mr. Sammis immediately upon his return to the East.

We are more than pleased to find that you have such a reliable receiver and await with impatience your further information on the subject.

In accordance with instructions given by Mr. Sammis before he left here, we got into touch with young Armstrong, who by the way is a boy not much over twenty one. He was taken down to Belmar and together with Mr. Weagant, one of our electrical experts, and David Sarnoff, our chief of construction and one of our most experienced operators, made experiments on the receiving apparatus.

Full reports of these experiments were made and are herewith submitted to you for your information, and we feel sure that you will be very much interested in these reports. The receiver certainly

seems to be a wonderful piece of work and the only question now arising is, does it impinge or infringe on existing patents, either yours, Lodge's, or possibly the DeForest Audion.

I took counsel with Mr. Betts and on his advice I today had a very interesting interview with Mr. Armstrong and his coun sel, Mr. Davis, who by the way was formerly employed in Mr. Betts' office. I was unable to find out what they wished to do in the matter of the receiver and naturally I am not yet in any position to make any offer to them.

Mr. Davis says that the affair is too much "in the air" to give any definite idea as to what young Armstrong would want. I have, however, arranged that Mr. Davis shall call on Mr. Betts, shall disclose to him the circuits and drawings and at the same time shall give Mr. Betts an undertaking that no steps toward disposing of the invention shall be made until the full examination of the records are made to see whether the invention is in conflict with anything already discovered. The result of the examination as made by Mr. Betts will be communicated to you at the earliest possible moment as of course we do not wish nor do we intend to do anything without fully consulting you on the subject.

I have seen Mr. Betts since my interview with Mr. Davis and Mr. Armstrong and have told him to get as long a time on the option as he possibly can in order that we may be able to communicate with you and to have your advice on the subject.

Attached to the report of Mr. Sarnoff are copies of the

messages which were received at the Belmar station and which are referred to in his report.

Yours very truly,

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA.

By H. Sutton

Vice-President.

Enclosure.

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MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA

WOOLWORTH BUILDING

233 BROADWAY

INTER-DEPARTMENT
CORRESPONDENCE

NEW YORK, February 2nd, 1914.

Mr. F. M. Sammis, Chief Engineer,
H E A D O F F I C E.

Dear Sir:-

On January 30th I met Mr. Armstrong, Professor Morecroft and Mr. Wiegant, with whom I proceeded to our high power station at Belmar, N. J. to test Mr. Armstrong's receiving system.

Two aerials were erected, one about 1600 ft. long and the other the entire length of the masts erected at Belmar.

Signals were heard from Clifden at about 4:00 p.m. (New York time) and from this time until we finished experimenting, which was about 5:00 a.m. (New York time) January 31st, no appreciable variation of the intensity of Clifden signals was noticeable. As there were no facilities at hand such as a galvanometer or shunt telephone method for making actual measurements of the received energy, the observations were of course, made entirely by ear and therefore, not accurate. However, there was no difficulty in reading Clifden signals when the telephone receivers were on the table and I stood about 12 ft. away from the telephones. With a loud speaking telephone connected to the receivers, signals could be read in the adjoining room. Signals from Glace Bay were very good and very strong. Better results were obtained on Clifden signals when using the smaller antenna. This is probably accounted for by the fact that the fundamental of the large antenna at Belmar is in excess of the wave length employed at Clifden.

Armstrong's receiver was compared with our standard 101 navy type tuner together with the cerusite and carborundum detectors. Speaking relatively of received signals means of course, very little since the human ear is not to be depended upon, but an idea of the difference may be obtained when it is stated that signals from Clifden on Armstrong's receiver could be read with ease with telephones on the table when signals on our receiver were barely readable with the telephones on the ears.

The Armstrong receiver proved its greatest value when used in conjunction with continuous waves.

Signals from the Poulsen Station at Frisco, which I understand is about 35 K.W. having an approximate overall efficiency of 25% thus radiating from the antenna about 9 K.W. were received at

Belmar at about 8:00 p.m. (New York time). The received signals from Frisco were about 100% stronger than the loudest signals received from Clifden. The signals from Frisco were read during various times from 8:00 p.m. to midnight (New York time). I copied several messages and attach them hereto. The Poulsen Station at Frisco was working with Portland, Ore. sending messages at the rate of 35 to 40 words a minute. Static was quite troublesome, yet the signals were sufficiently strong to enable me to read with ease at this speed.

Off hand I would say that the relative merits of this receiving system as compared between the continuous and dis-continuous wave systems is approximately about ten to one in favor of the continuous waves. I base my rough calculations on the following:-

Assuming that Clifden puts into the antenna about 75 K. W. and assuming that the Poulsen Station at Frisco radiates about 10 K.W. and considering the fact that the Belmar antenna is placed with directional advantages for the reception of Clifden signals and at a disadvantage when receiving from Frisco, and then noting the fact that Frisco signals are considerably stronger than those received from Clifden, it is evident that this receiver is most advantageous when receiving continuous waves. Further the fact that Frisco's signals are received entirely overland while those coming from Clifden are over water is another factor to be considered.

At about midnight(New York time) I heard "HU" - Poulsen Station at Honolulu - trying to work with the Poulsen Station at Frisco. Local static there was apparently very bad for the Honolulu Station said to Frisco as follows:

"Lighting bad, shall ground aerial wires"

Frisco replied: "O. K. Will call you in fifteen minutes for R. P."

Signals received from Honolulu were sufficiently strong to be read with the telephones on the table.

I listened for further work between Frisco and Honolulu but Honolulu appeared to have been having considerable trouble with their arc and this added to the local static conditions, apparently made it impossible for them to transmit and receive messages.

There is absolutely no doubt in my mind as to the fact that the HU Station was the Poulsen Station at Honolulu, for scraps of conversation between the two stations at Frisco and Honolulu were sufficiently convincing to enable me to identify the stations.

At 1:25 a.m. January 31st I heard the Telefunken Station

at Nauen, Germany calling "P.O.Z". This was on the continuous waves, apparently using the Arco generator system. The wave length employed was about 9500 meters. I copied the attached message which was transmitted by Nauen and received by Sayville. The text of the message and the beginnings and endings signified very clearly that it was the Nauen Station transmitting. The signals from the Nauen Station were very good and strong.

Mr. Armstrong did not wish to impart to us any information regarding the arrangement of his circuits but observations proved the following advantages of his system:

1.- He can work with an extremely loose coupling as loose as 1% and this with no decrease of the signal intensity and a consequent decrease of static. Looser coupling can be obtained on the continuous waves than the dis-continuous and for this reason he was able to eliminate a considerable amount of static interference when receiving from Honolulu and Frisco, while he was not able to eliminate the same amount of static interference when receiving from Clifden.

2.- The note of the continuous waves is varied at will and can be made to sound like the ordinary hiss of the arc or an exact reproduction of a thousand sparks per second note. In fact he goes beyond this spark frequency and can bring the note almost beyond audition. This group tuning, or better said group production, is noticed only on the continuous waves. For the discontinuous waves, he inserts the usual inductance and capacity in the telephone circuits and produces group spark frequency tuning in the ordinary manner. The tone production on his continuous wave is accomplished apparently by resonance changes in his receiving circuits for I could myself produce any desired note when receiving from Frisco by merely changing the capacity of one air condenser, but I am not able to say in what circuit this condenser was connected.

I understand that Mr. Wiegant is also making a report on this subject.

In conclusion I would state that the results obtained with Mr. Armstrong's receiver are sufficiently convincing to warrant our most careful investigation of his patents and circuits, etc., for I believe that his device has tremendous advantages and unless there be other systems of equal merits ~~am~~ which are unknown to me, I am of the opinion that he has the most remarkable receiving system in existence.

Yours very truly,

D. Sarnoff

DS/R

Chief Inspector.

PLEASE ADDRESS ALL COMMUNICATIONS TO THE COMPANY

MARCONI WIRELESS TELEGRAPH COMPANY OF AMERICA

WOOLWORTH BUILDING

233 BROADWAY

INTER-DEPARTMENT
CORRESPONDENCE

~~NEW YORK,~~

Roselle Park, N. J., Feb. 2, 1914.

Mr. F. M. Sammis, Chief Engineer,
Head Office,
New York, N. Y.

Dear Sir:-

REPORT ON TEST OF ARMSTRONG RECEIVING SYSTEM AT BELMAR. JAN. 30, 1914.

The results of the test made by Mr. Saranoff and myself at Belmar between 4:30 P.M. and 6 A.M., January 30 and 31, 1914, were as follows:-

1. The Signals from Glace Bay. The #101 Tuner was adjused until the maximum possible signal was received working on large aerial and using the cerusite detector. The signal received was sufficiently loud to be heard with the telephones about two feet from the ear. Mr. Armstrong then tuned in Glace Bay, and obtained a response in the telephones which was so loud, that it could easily be read, I should say fifty or sixty feet away from the telephones.

2. Signals from Clifden, Ireland. Tuner #101 gave a fairly good response to Clifden signal, just about strong enough to be readable through the static. The Armstrong System gave a response to Clifden signal, which could be read five or six feet from the telephones. It appeared to me that his signal from Clifden was four or five times as strong as the best response which I could obtain from Glace Bay.

3. Signals from the Poulsen Arc Station at San Francisco.

This signal being of the continuous or undamped type, could not be heard at all on the #101 Tuner, but produced an exceedingly strong response in the Armstrong System, and was read with ease by Mr. Saranoff. At one time San Francisco was transmitting at the rate of about forty words a minute, all of which was copied by Mr. Saranoff.

Mr. F. M. Sammis-

4. Signals from Poulsen Station at Honolulu. Continuous oscillation, same as San Francisco was heard to report to messages from San Francisco; signal being so strong, that I could hear it about four feet from the telephones. Owing to excessive static it was not easy reading, although Mr. Saronoff read sufficient to absolutely identify it.

5. Signals from Nauen, Germany. The Telefunken station at Nauen, Germany, were sending out messages to Sayville, Long Island, was heard with great ease. The signal being, I should say about twice as strong as Clifden. He was working with some form of transmitter, which produced continuous oscillations, probably Count Arco's transformer arrangement, and was working at about 9,400 meters.

We listened for Coltano, Italy and Hanover (Goldschmidt System) but neither of these stations appeared to be working. Mr. Armstrong stated that Hanover would probably have come in two or three times as strong as Nauen, as he has previously heard him at Columbia. Ofcourse all the smaller and nearer stations were heard, but we did not bother much with them.

It is my opinion, based on the result of these tests, that Mr. Armstrong, has a system of an enormous practicable value, and that the results obtained Friday night, were so far in advance of anything possible with our present methods, that it constitutes a new era in the art of wireless signaling. In addition to the tremendous sensitiveness of this apparatus, the following exceedingly important points were noticed:-

1. It will work on either a spark transmitter or one emitting continuous oscillation .

2. It gives to continuous oscillations, a group frequency or note. It can be varied at will from the lowest audible pitch to the highest audible pitch without the use of commutator, interrupter or moving parts of any kind.

3. It appeared to be capable of a very much higher degree of selectiveness than is usually possible, and I noticed repeatedly that interfering signals which bothered me greatly when using the #101 Tuner, were almost entirely eliminated with Mr. Armstrong's apparatus. This refers to wave tuning, and it should be mentioned here that, when working with continuous oscillations, it is possible to obtain still further degree of selectiveness through the production of a note whose pitch can be made anything which may be desired.

4. Elimination of Static. Due to the fact that this apparatus, on account of its great sensitiveness can be operated at very loose couplings, it is possible to do a great deal in the elimination of static disturbances, which cannot be done with the usual form of receiving apparatus.

Mr. F. M. Sammis-

5. Notwithstanding the fact that this apparatus has been constructed primarily for use in the laboratory, and by one unskilled in the design of apparatus for commercial use, it is not complicated in construction nor apparently difficult to handle. Furthermore the detector does not have to be fiddled with and continually readjusting when struck by heavy static or extra loud signals; in fact the only effect of these seemed to be a momentary choking, which lasted so short a period as to be only slightly objectionable.

6. By the use of this type of receiver and a trans-mitter producing continuous oscillations, it appears to me that enormous savings in expense can be made, for instance; judging from the signals received from San Francisco and Honolulu, I would say that a Goldschmidt alternator operating anywhere in the British Islands, and putting 50-KW into the aerial would with this apparatus produce signals at Belmar of such intensity, that they could be read at anytime of day or night, or at any season of the year and through almost any static, exclusive ofcourse, of thunderstorm in the immediate vicinity likely to be met with. On the other hand, from the strength of the signals received from Clifden on the #101 Tuner, I would say that with our present methods, Clifden signals would have to be multiplied at least one hundred times in order to make this possible; obviously, this would involve prohibitive expense in the construction of the transmitting station. Ofcourse it is probably that with a receiver of the usual type, constructed especially for this TransAtlantic work, we could get better results then with the #101; but from my experience and knowledge of the subject, I would say that we would be limited in this respect to something like three or four times of this obtained with the #101. I would therefore suggest that the following things be looked into.

1. That we obtain through Mr. Armstrong's attorney as complete information as possible relative to his circuits, etc., and shall then submit the facts obtained to Mr. Betts to the end that we may know whether or not his patents will not be subject to the Audion Patents of DeForrest; if not, they will be of tremendous value to us.

2. If it is found that these patents are subject to DeForrest Audion Patents, I would suggest that Mr. Betts go into the question of whether or not DeForrest Patents, in turn are not subject to the Flemming Valve Patent. If they are, we can, no doubt, do one of two things, prevent DeForrest and Armstrong from using their apparatus, or better still, force them to permit us to use their apparatus in return for the privilage of a license to them under Flemmings Master Patent. In this connection, I would like to mention also, that the results obtained by the DeForrest Audion Amplifier, are reported to be of the same order as those obtained from the Armstrong System.

Mr. Butcher has been working with the former, and I would

Mr. F. M. Sammis-

suggest that he be directed to arrange with me to conduct experiments at the Aldene Factory, in order that we may know how the two systems compare.

I should be very glad to work evenings with Mr. Butcher and do everything necessary to assist him in this work, as I feel that these two new receiving systems are of such tremendous importance to the wireless business that the Marconi Company should leave no stone unturned in obtaining full information relative thereto and in acquiring the necessary rights to their use.

I wish to point out further that not only will this be of great value in our Trans-Atlantice long distance work, but also in our regular ship business, in as much as it will enable us to obtain results equal to those obtained at present with very great reduced power at the transmitting end or to obtain very greatly improved results with the present amount of power.

Yours very truly,

RAW/SH.

R A Weagant

1:25 a.m. January 31st,

Nauen Sending.

POZ

Anfang-

Differs from that usually found in Direct Current work in so far as each Controller is fitted with two spare part groups of contacts corresponding to the chosen methods of shèp by item controlling with alternate interruption of two circuits from the controller the current passed through a choking coil to the two motors on? - Bogie then are permanently connected in parallel thence in passes x to earth that is to the zero terminal of the low tension winding of the transformer.

Ende - Schluss

Message received - G. M. Tks.

59 words D.M.

(Sigs good)
( )
(Static bad)

Poulsen Station - San Francisco - Sending.

Midnight to 1:00 a.m.

Press to Honolulu.

Winthrop Moore Daniels of Princeton Champion New Jersey Public Utilities Henry Clay Sally Colorado Springs, President Colorado Bar Association, probably named members Interstate Commerce Commission South Carolina Mines Land Partan Prince.

Norfolk

Hilda Haviland rescued. Lost passengers 19
x x
Crew 24. Saved passengers 36. Crew 55.

(Sigs. good and strong)
( )
(Static bad.)

HONOLULU

At midnight sending to Frisco.

Says- N?

"Lighting bad. Shall ground aerial wires."

Frisco says:

"O.K. Will call you in 15 minutes for R.P."

Honolulus sigs good and strong but he's apparently having trouble with his arc.

FRISCO sending to PORTLAND

About 35 to 40 words per minute - Static bad
Sigs. very strong.

(104)
Blue San Francisco

John A. Roebling.

Fush Avenue South Seattle, Washn. quotes four hundred twenty feet, three feet wide. Steel cloth galvanized after triple three quarter meets number twenty-four five six number twenty-two wire Sinequdar foot freight prepaid Seattle. Can make about two Commission five percent.

John A. Roeblings Sons Co.

(98) San Fran. Cal.

Clark Co., Tacoma, Washn.

Cannot make tomorrows boat Spinach Draw on Seattle.

Calif. Fruit Can. Co.