

Contractors to H.M. Admiralty, India Office, War Office,  
G.P.O. and the Leading Home & Foreign Railways.

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ELECTRICITY, WESTCENT, LONDON.

Cable Address:  
POLYPHASE, LONDON.



HEAD OFFICE

MAGNET HOUSE,

KINGSWAY, LONDON, W.C.2. 9th August, 1934.

H.C.W.

Codes Used  
NEW STANDARD, LOMBARD,  
WESTERN UNION (5 LETTER ED.)  
A.B.C. (6TH EDITION) AND PRIVATE.

REGISTERED



Leo Szilard, Esq.,  
6, Halliwick Road,  
MUSWELL HILL,  
N. 10.

Dear Sir,

With reference to your letter of the 20th July, addressed to Dr. Railing, in his absence, I have communicated with Mr. Paterson, who informs me that as far as production of artificial radium for medical use is concerned, our Company cannot interest itself in this application.

With reference to the larger issue which you raise, Dr. Railing, with whom I have communicated, asks me to tell you that he thinks the issue is one which is so far outside the scope of a Company's normal activities, that unless the proposition takes some much more definite shape, it would be impossible to participate.

Yours faithfully,

*H. Gibson*



PLEASE ADDRESS  
COMMUNICATIONS TO  
THE DIRECTOR.

TELEGRAMS: RESEARCH, PHONE, WEMBLEY.  
TELEPHONE: ARNOLD 4321 (TEN LINES)

NEAREST STATION:  
NORTH WEMBLEY,  
[BAKERLOO  
& L. M. S.]

OUR REFERENCE  
YOUR REFERENCE

LDG/NRC/20R28.

RESEARCH LABORATORIES OF THE  
GENERAL ELECTRIC COMPANY, LTD.

WEMBLEY.

9th August, 1934.

L. Szilard Esq.,  
6, Halliwick Road,  
Muswell Hill,  
N.W.10.

Dear Dr. Szilard,

In reply to your letter of the 31st July, the reasons for our belief that your patent application lacks novelty is that the discovery that disintegration could be produced by neutron bombardment was made by the Joliot's and was prior to your patent. After that discovery it was naturally to be expected that neutrons could disintegrate heavy as well as light nuclei.

As regards your second point concerning the commercial value of your invention, it appears to us that original particles, first producing neutrons and then alpha particles, would produce not more than one alpha particle for  $10^{13}$  original particles. Accordingly to produce a current of  $10^{-12}$  amp. carried by alpha particles would require the expenditure of several thousand kilowatts. That does not seem to us a commercial proposition..

We note that you think there is a slight misunderstanding concerning the rest of our letter, and that you

may/



may revert to this matter later on.

Yours very truly,

For and on behalf of the  
Research Laboratories.

*C. C. Paterson* *L.S.*

Director.

BMO.



R-1

Enclosure to the Letter of the 14th August, 1934 to  
Mr. Paterson.

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1. Efficiency.

You state that in your opinion original particles first producing neutrons and then radio-active atoms would not produce more than one radio-active atom for  $10^{13}$  original particles. I can show that your figure is wrong by a factor  $10^7$  to  $10^{16}$ .

2. Novelty.

a). You state that the discovery of induced radio-activity by neutron bombardment was made by the Joliot's. I assume this statement of yours is a clerical error and that what you meant was that the Joliot's induced radio-activity by alpha particle bombardment, as evidently the effect in question was discovered by Fermi.

b). Whether after the discovery of the Joliot's it was natural to expect a similar effect for neutrons for light elements is a question which we may leave open for the present. All I have to say on this point is to emphasize the fact that in the three months that elapsed between the Joliot's and Fermi discovery no other laboratory made Fermi's unquestionably important discovery, and that in spite of the fact that it takes a few hours to improvise an experiment for its demonstration in the laboratories where Geiger counters and Radon are tools of routine work, and that your expectation for the Fermi effect as stated in your letter is off <sup>the</sup> a mark by many powers of 10.

c). As to the question whether a similar effect was to be expected for neutrons in heavy elements I wish to state that such an effect was not to be expected and has not been found. What has been found is a different process



in which there is no chemical change as the neutron apparently gets swallowed without a simultaneous ejection of a proton or an alpha particle and this peculiar process is 100 to 1000 times more efficient than anticipated.

(See one of Professor Fermi's papers in "Nature")



6, Halliwick Road,  
London, N.10.

17th March, 1934.

Dear Sir Hugo,

As you are on holiday you might find pleasure in reading a few pages out of a book by H.G. Wells which I am sending you. I am certain you will find the first three paragraphs of Chapter The First (The New Source of Energy, page 42) interesting and amusing, whereas the other parts of the book are rather boring. It is remarkable that Wells should have written those pages in 1914.

Of course, all this is moonshine, but I have reason to believe that in so far as the industrial applications of the present discoveries in physics are concerned, the forecast of the writers may prove to be more accurate than the forecast of the scientists. The physicists have conclusive arguments as to why we cannot create at present new sources of energy for industrial purposes; I am not so sure whether they do not miss the point.

It is perhaps possible to be more definite some time after your return, and in the meantime I hope you will in any case enjoy glancing through those few pages.

With best wishes for a pleasant stay,

Yours very truly,

Sir Hugo Hirst,  
Carlton Hotel,  
Cannes.



Contractors to H.M. Admiralty, India Office, War Office,  
G.P.O. and the Leading Home & Foreign Railways.

Telephone: (LONDON)  
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Cable Address:  
POLYPHASE, LONDON.



HEAD OFFICE

MAGNET HOUSE,

KINGSWAY, LONDON, W.C.2. 26th April, 1934.

A.H.R.

Codes Used:

NEW STANDARD, LOMBARD,  
WESTERN UNION (5 LETTER ED.)  
A. B. C. (6TH. EDITION) AND PRIVATE.

REGISTERED



Dr. Szilard,  
6, HALLIWICK ROAD,  
N. 10.

Dear Dr. Szilard,

I have been away and have only just received your letter of April 9th.

You ask me whether I have formed any opinion on the subject of our discussion. You will remember that this matter was left somewhat vague, because you were in the middle of certain considerations, and if I remember rightly, it was left that you would see me again in a few weeks' time when you might be somewhat more definite, and I could then think the matter over and put it before Sir Hugo Hirst.

Yours truly,



6, Halliwick Road,  
Muswell Hill,  
London N.10.

18th June, 1934.

Dr. A.H. Railing,  
General Electric Co. Ltd.,  
Magnet House,  
Kingsway W.C.2.

Dear Dr. Railing,

I should appreciate it very much if you could let me know whether you and Baron Hirst think that I should discuss with Mr. Paterson the production of artificial substitutes for radium for medical purposes, or whether you have decided that your Company is not interested in the matter.

Should you like me to see Mr. Paterson perhaps you would find it possible to arrange that I should meet him at an early date.

Yours very truly



20th July, 1934.

Dr. H. Railing,  
General Electric Company,  
Magnet House,  
Kingsway, W.C.2.

Dear Dr. Railing,

Following your suggestion I saw Mr. C.C. Paterson yesterday. We limited the conversation to the question of the production of artificial "radium" for medical use, as this is the only issue on which experimental data either published or under publication are available which would enable your research laboratory to check statements I am able to make on the subject.

As to the other more important issues I have shifted my ground since I last saw you. I see my way now to get information on the vital points by fairly simple experiments, and I shall therefore immediately attempt to find a frame and facilities for such experiments.

The matter is complicated by personal issues. I have been appointed as a research associate to the New York University and shall have to visit New York in the second half of September. Not knowing whether the circumstances in New York are favourable for my experiments I have not accepted this appointment as yet, and we agreed that I shall be free to resign at the beginning of the term.

I shall use the time between now and the middle of September to see if I can find whole-hearted support in this country for the enterprise on which I am embarking. I am getting into touch with several persons for this purpose.

As far as your Company is concerned I should appreciate any positive or negative statement concerning your willingness to co-operate. Some difficulty will doubtless arise from the fact that you will be unable to form a direct opinion on my suggestions; the only solution of ~~which~~ difficulty that occurs to me would be that I give a detailed picture to some third person who is attached to one of the English universities, and that you should get information from him about his views on the subject.



Dr. H. Railing

-2-

20th July, 1934.

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I shall be glad to receive any suggestions from you on this point, and could probably be at your disposal at any time until the beginning of September, possibly until the middle of September.

Yours very truly,



PLEASE ADDRESS  
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THE DIRECTOR.

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TELEPHONE: ARNOLD 4321 (TEN LINES)

NEAREST STATION:  
NORTH WEMBLEY,  
[BAKERLOO  
& L. M. S.]

RESEARCH LABORATORIES OF THE  
GENERAL ELECTRIC COMPANY, LTD.

OUR REFERENCE LDG/20R28.  
YOUR REFERENCE

WEMBLEY.  
27th July, 1934.

Dr.L.Szilard,  
6, Halliwick Road,  
Muswell Hill, N.W.10.

Dear Dr.Szilard,

In accordance with the discussion we had when you were here last week, Dr.Campbell has examined the specification you left with us. As a result, we have come to the conclusion that we should not be interested in this invention, for the following reasons.

In the first place, we do not think it contains anything which is really new; in the second place we are not convinced that even if the patent could be upheld, it would be of any practical value.

As regards other ideas which you might care to submit, we have noted the suggestion in your letter to Dr.Railing that this should be done through a third party in one of the Universities. We do not see how this scheme could help, since it would in any case be necessary for this third party to communicate your ideas to us before we could decide whether or not they were of interest to us.

We/





We should much prefer that any ideas you put forward for our consideration should first be covered by patents; this will allow us to study them and discuss them freely with you without any fear of subsequent misunderstanding.

Meanwhile, we should like to thank you for having brought the matter before us, and we shall be pleased at any time to examine any concrete proposals you may put forward, subject to the above proviso.

We return your specification herewith.

Yours very truly,

For and on behalf of the  
Research Laboratories.

A handwritten signature in cursive script, appearing to read "O. O. Patterson".

Director.

V.C.



6, Halliwick Road,  
Muswell Hill,  
London N.W.10.

31st July, 1934.

C.C. Paterson, Esq.,  
Research Laboratories of the  
General Electric Company Ltd.,  
Wembley.

Your Ref. LDG/20R28.

Dear Mr. Paterson,

I am very grateful to you indeed for having come to a quick decision. This is most essential for me in the circumstances.

The "radium" for medical use being a rather limited field I did not anticipate that you would be very much interested in it. In view of the fact, however, that the process put forward in my patent application is based on an effect which has been discovered by Professor Fermi after I filed my application, I should appreciate it very much if you could kindly substantiate the reasons for your belief that the patent application does not contain anything which is really new.

I also should be very much interested to learn why you think that the patent, if it could be upheld, would still not be of any practical value. Do you mean that the power consumption involved in the process would lead to a price which could not compete with natural radium? And if so, on what assumptions did you come to that conclusion? If you mean something else could you perhaps kindly let me know what precisely you had in mind?



C.C. Paterson, Esq.

-2-

31st July, 1934.

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Many thanks for the information contained in the second half of your letter. There is probably some slight misunderstanding somewhere, and it might, therefore, be useful that I should revert to the matter later on.

Thanking you once more for your prompt attention to this matter, I remain,

Yours very truly,



LEO SZILARD

Strand Palace Hotel,  
Strand, London W.C.2.

14th August, 1934.

Dear Mr. Paterson,

Many thanks for informing me in your letter of the 9th August of the reasons for your belief that the manufacturing of radio-active bodies for medical use which I discussed with you would be:

- 1) too inefficient to be of any practical value, and
- 2) that the process for which I filed a patent application could not be considered as new at the time of filing.

I am afraid I have to contradict almost every statement you make in your last letter. I am enclosing a detailed statement on the subject from which you will see that the efficiency of the process is in my opinion  $10^7$  to  $10^{10}$  times larger than stated by you, and that the process involved is entirely different from that discovered by the Joliot's.

As I told you I limited the conversation with you to one issue because I was anxious to make only statements for which there is evidence already available in form of experiments that have already been published. Therefore I am in a position to prove every statement that I make on this issue on the basis of publications from the Cavendish and the Paris and Rome Laboratories. I am aware that it must be very difficult if not impossible for any of your experts to form an opinion on the subject without being



in possession of the reprints of certain recent publications which are not available in your libraries, but I can let you go over those reprints.

May I emphasize that while the assumptions on which you based your decision, which has been communicated to me by Magnet House, can in my opinion not be upheld, it is not my intention to ask you to reconsider your decision. On the other hand I would rather not leave the matter where it is, and am certain you will appreciate my reasons.

As you know I discussed the possibility for practical applications of nuclear physics with Dr. Railing which go much beyond the scope of the issue with which we have to deal here; if I am to go on with these discussions it is essential that no doubt should be cast upon my statements through the fact that there is a divergence between your opinion and mine expressed by a factor of  $10^7$  to  $10^{10}$ . If I were wrong by a factor 10 in the present issue I certainly would have no right to claim the full attention of Magnet House as I intend to do.

I wish to thank you once more for having substantiated the reasons on which your decision was based.

Yours very sincerely,

*Lev Prilard*



Enclosure to the Letter of the 14th August, 1934 to  
Mr. Paterson.

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1. Efficiency.

You state that in your opinion original particles first producing neutrons and then radio-active atoms would not produce more than one radio-active atom for  $10^{13}$  original particles. I can show that your figure is wrong by a factor  $10^7$  to  $10^{10}$ .

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a). You state that the discovery of induced radio-activity by neutron bombardment was made by the Joliot's. I assume this statement of yours is a clerical error and that what you meant was that the Joliot's induced radio-activity by alpha particle bombardment, as evidently the effect in question was discovered by Fermi.

b). Whether after the discovery of the Joliot's it was natural to expect a similar effect for neutrons for light elements is a question which we may leave open for the present. All I have to say on this point is to emphasize the fact that in the three months that elapsed between the Joliot's and Fermi discovery no other laboratory made Fermi's unquestionably important discovery, and that in spite of the fact that it takes a few hours to improvise an experiment for its demonstration in the laboratories where Geiger counters and Radon are tools of routine work, and that your expectation for the Fermi effect as stated in your letter is off the mark by many powers of 10.

c). As to the question whether a similar effect was to be expected for neutrons in heavy elements I wish to state that such an effect was not to be expected and has not been found. What has been found is a different process



in which there is no chemical change as the neutron apparently gets swallowed without a simultaneous ejection of a proton or an alpha particle and this peculiar process is 100 to 1000 times more efficient than anticipated.

(See one of Professor Fermi's papers in "Nature")



Strand Palace Hotel,  
Strand, London W.C.2

5th September, 1934.

C.C. Paterson, Esq.,  
Research Laboratories of the  
General Electric Company Ltd.,  
Wembley.

Dear Mr. Paterson,

I wish to thank you for your letter of August 9th in which you are kind enough to disclose the information on which you based your opinion concerning the novelty and the efficiency of the method which I suggested.

I am very sorry to say that in my opinion your information on both these points is not in accordance with the facts, and I regret that such a divergence of opinion should have arisen at this juncture.

I do not propose to re-open the subject of manufacturing artificial "Radium" for medical use just now but may come back to the subject later on. Evidently there would be no point in going further until the present divergence of opinion has been settled.

Thanking you again for the attention you gave to the matter, I remain

Yours very truly,



Strand Palace Hotel,  
Strand, London W.C.2.

30th October, 1934.

C.C. Paterson, Esq.,  
Research Laboratories of the  
General Electric Co. Ltd.,  
Wembley.

Dear Mr. Paterson,

I thank you very much for your very kind letter of the 1st instant, from which I see that there is no longer a divergence of opinion on the question of the probable novelty of the invention which I submitted to you. I assume that the divergence of opinion on the question of efficiency still persists. My estimate differed from yours at the time when I submitted to you this invention by a factor of more than 10 million, and I based my estimate on the information which was available at that time. Since then progress has been made which in my opinion has greatly improved the efficiency.

Yours very truly,



PLEASE ADDRESS  
COMMUNICATIONS TO  
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TELEPHONE: ARNOLD 4321 (TEN LINES)

NEAREST STATION:  
NORTH WEMBLEY.  
(BAKERLOO  
& L. M. S.)

OUR REFERENCE CCP.20R28.  
YOUR REFERENCE

RESEARCH LABORATORIES OF THE  
GENERAL ELECTRIC COMPANY, LTD.

WEMBLEY.

Dr. L. Szilard,  
6, Halliwick Road,  
Muswell Hill, N.W.10.

1st October, 1934.

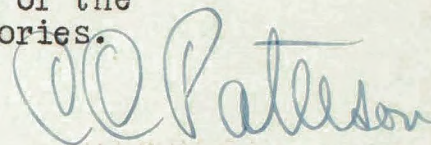
Dear Dr. Szilard,

In our letter of August 9th 1934, we stated that disintegration by neutron bombardment was discovered by the Joliot's. In your letter of September 5th you challenged that statement.

We realize now that you are right and we are wrong and that this statement is false. We ask you to accept our apologies for an inadvertent error. But we fear that the recognition of it does not change our decision on the main issue.

Yours faithfully,

For and on behalf of the  
Research Laboratories.



Director.

VM.