

A.A. Thornton & Co.

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Your Ref. RPM/MC/27

Our Ref. PD/JP

20th July, 1949

G. Meier, Esq.
Trubenised (Gt. Britain) Ltd.
17/18 Old Bond Street
London W. 1

Dear Mr. Meier,

Professor Szilard

As promised, I give you below my present views on the subject of Professor Szilard's patent No. 440023. As you know, my knowledge of nuclear physics is extremely sketchy and it may well be that I have erred through ignorance of the subject matter with which this patent is concerned. If that is so I will no doubt be corrected and may as a result have to modify the conclusions at which I have arrived.

I regret to say that my present view is that the patent is invalid, and I can see no way whatever of amending it so as to make it valid and still cover anything which would be of real importance and value. (It may well be that valid claims are possible to the methods and means for producing neutron radiation which are described in the specification, but I understand that these are not now of any real practical interest and that there is no point in pursuing this aspect of the matter, which is accordingly disregarded in what follows). The basic difficulty about the matter is that I can find no patentable invention described in the specification and no rewording of the claims can possibly alter that fact.

Shortly before the date of the original application, an article by Joliot and Curie in "Nature" had described the transmutation of certain light elements into radio active elements when they were subjected to bombardment with α particles, and suggested that similar transmutations might be caused by bombardment with other particles, protons, deuterons and neutrons being specifically mentioned.

/Professor

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Professor Szilard's patent specification proposes to produce radio active elements by bombarding a thick layer of a suitable element with neutrons. The first provisional does not state that any specific element will transmute to a radio active element when it is bombarded as proposed. The third provisional specification lists several elements which, under these conditions, will transmute to their own radio active isotopes. The complete specification refers to these elements as a class but only specifically mentions iodine. As I understand the matter, Professor Szilard does not claim to have had any greater or earlier knowledge than had other physicists as to which elements would transmute into radio active elements when bombarded with neutrons. The specification is not based on the choice of any particular element for bombardment. On the contrary, the plan set out in the specification is to test all the elements (the actual words used in the first provisional specification were "all the elements of the periodical system with the exception of the rare gases, Rhenium, Masurium and the radio active elements, but including uranium, thorium and all the alkali elements" and it is as well to bear this wording in mind in the following discussion) and discard those which do not give the desired result. The specification contains the ingenious suggestion that one can make sure of obtaining a successful result by treating the mixture of all the elements.

The only additions made by the specification to the previous suggestion by Joliot and Curie seem to be (1) the particles used for bombardment are to be neutrons, (2) the thickness of the layer is to be at least equal to (or, in one passage, of at least "the order of magnitude of") the mean free path of the neutron, (3) heavy as well as light elements are to be tested. Only the first of these three points appears in the present claim 1, but it is suggested that the others might be incorporated in that claim by amendment.

Claim 1 as it stands covers any and every process in which an element is transmuted into a radio active element by subjecting it to bombardment by neutrons. By ingenious wording, the scope of the claim is limited to cases in which such transmutation does take place, so that no attack could be made on the claim on the ground that it covers an inoperative process. The claim as it stands seems to be completely lacking in inventive subject matter over the disclosure of the Joliot-Curie article. If there is subject matter it must lie in the choice of neutrons as the bombardic particles. I am very doubtful whether as a matter of law the

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choice of one out of three or four specifically suggested alternatives could ever be a patentable "selection". In this case, moreover, I understand that the advantages of using neutrons and thereby avoiding ionization losses would have been "obvious" to other physicists at the date of the patent. In my view, therefore, the claim is bad for lack of subject matter.

The claim is also open to attack on the grounds explained in Mr. Perrin's letter to Professor Szilard dated 26th April 1949, which in legal terminology would be that the claim does not sufficiently clearly define the scope of the monopoly, and that the specification does not sufficiently describe the manner in which the invention is to be carried into practice. However, the objection is phrased, it is based upon the fact - that the specification offers no guidance whatever (apart from the indications already quoted above) as to which of the elements will yield a radio active product when bombarded with neutrons. The specification and claims really boil down to this: "you try Joliot and Curie's suggestion on all the elements and test the results, and I then claim all the cases in which the process works". On my present understanding of the matter, this objection goes to the root of the matter and must succeed.

As to the suggested amendments, I do not think as a matter of legal practice that it would be possible to put forward three separate claims in the place of the present claim 1. We would have to choose one out of the three suggested lines of amendment or some modification of them, and attempt to amend claim 1 into those terms. The amendment first suggested by Professor Szilard is, I think, allowable. The first change is to specify that the element treated is a "natural element". This is clearly the intention of the descriptive part of the specification, and the amendment would, I believe, be allowed as being an "explanation"; however, I do not see that it would help us in any way. The existing word "element" has been read by all as meaning "natural element" and no point has been made that the present term includes anything more than that. The only other change suggested is to specify that the layer which is bombarded with neutrons has "a thickness of the order of magnitude of the mean free path of the neutron or greater". This also is clearly contained in the specification from the first provisional onwards and would, I believe, be allowed either under the heading "explanation" or as a "disclaimer"

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of the treatment of any lesser thickness. Again, I am not at all sure that the amendment would help us in any way. It seems to me clearly obvious that for good efficiency layers of such thickness should be used, and I should have expected that their use would have been obvious at the date of the patent to any physicist who was concerned with such matters. If this is so, the amendments do not seem to help us on the subject matter question. Certainly these amendments do not do anything whatever to meet the other objection to the validity of the patent.

The second suggested amendment is to limit the claim to the treatment of a "natural heavy element". I am more doubtful whether this amendment would be allowable. Certainly in form it is a disclaimer. It is clear that heavy elements are included in the specification as it stands, but they appear to be included only equally with other elements. If there is any invention in choosing "a heavy element" as the material for bombardment by neutrons, that invention (i.e., the choice) is not to be found in the original documents. In other words, if the amendment would be of any real value to us I do not think that it is allowable.

The third possible amendment which Professor Szilard suggests is to limit the scope of the claims to the treatment of "uranium or thorium". These two elements are, indeed, mentioned in the specification in the passage quoted above, but it is quite impossible to say that they are in any way particularly selected in the existing document, and I have no doubt at all that the amendment is not allowable. If any proof of this is necessary, all that is needed is to try to draft the amendment to the specification which would be necessary to support this limitation of the claim. It will at once be found that it is necessary to state as a fact that bombardment of these two particular elements by neutrons will cause transmutation to radio active elements - a piece of knowledge which was certainly not possessed by Professor Szilard or by anyone else on 12th March 1934.

I hope that the above remarks will at least allow you to put the English legal point of view before Professor Szilard and get his reactions. My own feeling at the moment is that it would be a waste of time and money to pursue the matter any further, but it is quite possible that I am missing the whole point owing to my profound ignorance of the physics involved.

Yours faithfully,

P. Drummond

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12th August, 1949

G. Meier, Esq.,
c/o Trubenizing Process Corporation,
350 Fifth Avenue,
New York 1, N. Y.

Re: Professor Szilard

Dear Mr. Meier:

Mr. May has sent on to me a copy of Professor Szilard's letter of 3rd August and of the memorandum enclosed with it. Professor Szilard's arguments are very ingenious and deserve far more detailed study than I can possibly give them in time to let you have a reply before you leave New York. I will consider the matter, however, but meanwhile you may like to have my immediate reactions.

I, of course, accept from Professor Szilard that in February 1934 Joliot and Curie's suggestions would not have been understood by physicists as meaning that the heavier elements were likely to give rise to radio active elements when they were bombarded with neutrons of the energies then available and that Szilard was the first to state that radio active elements could be produced by bombarding (some) heavier elements with neutrons of moderate energy.

This statement by itself is not a patentable "invention" but a forecast of the discovery which was soon afterwards made by Fermi. To complete the definition of a patentable invention (i.e. of a process for the production of radio active elements) it seems to me essential to specify the material which is to be bombarded. The device of saying that it is an "element which transmutes into a radio active element under the influence of the said neutron radiation" is highly ingenious but is, of course, definition in a circle and I cannot believe that our Courts would ever hold valid a patent which was based on such a definition alone unsupported by any operative examples in the body of the specification. I still feel extremely pessimistic about the chances of Szilard ever getting anything out of this patent. There are so many stages to cover and each of them bristles with so many difficulties. It seems to be agreed that the patent is not supportable as it stands and that some amendment is necessary. The allowability of the amendments suggested it, to say the least of it, open to question, and apart from resistance by the Patent Office, we are already threatened with opposition from Mr. Perrin's department. If the amendment goes through the validity of the patent would still be highly doubtful and from Perrin's letter of 5th August our chances of getting anything without fighting for it seem very small. With an amendment there is always the danger that any damages obtained will run only from the date of amendment, and as the normal term of the patent will have expired by the time the amendment goes through our victory would be a barren one unless we could obtain a prolongation. I have not really begun to consider our chances of getting prolongation, but I can already see grave difficulty of proceeding under the War Loss Section and it would probably be necessary to adopt the much more difficult and expensive course of petition to the High Court.

Yours faithfully,

P. Drummond

Copied by J.B. on 4/11/49.

A.A. THORNTON & CO.

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PD/JP.

3rd November 1949.

G. Meier, Esq.,
Trubenised (Gt. Britain) Ltd.,
17/18 Old Bond Street,
LONDON, W.1.

Dear Mr. Meier,

Professor Szilard.

In case you are interested, we observe that this week's Official Patents Journal contains an announcement of the re-assignment of Szilard's secret patent (applications No. 19157/34 and No. 19721/34). The specification will be published under No. 630726, but it will probably be about 6 weeks before printed copies are available.

Yours faithfully,

A. A. THORNTON & CO.