

PATENTS ACT 1977

BLO/003/84

IN THE MATTER OF Patent
Application 81.38438 in the
name of Picker International Ltd

DECISION

The Application was filed on 21 December 1981. After preliminary examination it was published on 21 July 1982. After one report under Section 18(3) and amendment to meet the objections raised, the examiner reported under Section 18(4) that the application complied with the requirements of the Act and Rules. Before the grant letter was issued, however, a request to amend the application was filed on Form 11/77, dated 28 October 1983. The examiner objected to the amendments requested on the grounds that they infringed Section 76 of the Patents Act, and the matter came before me at a hearing, on 18 January 1984, which was attended by the Agent Mr Pope accompanied by Dr Smith.

The invention relates to systems for examining a body, for example the body of a patient for medical purposes, by a Nuclear Magnetic Resonance (NMR) technique.

The specification refers to the applicants' prior specification 1,584,948 (EMI) which briefly explains that certain atomic nuclei, (in particular hydrogen nuclei, which are called protons) behave as dipoles, and also have a spin about the magnetic axis. If a steady field is applied to a sample in a first direction Z the nuclei align themselves with this magnetic field so that the resultant spin vector is parallel to the field, ie in direction Z. If now, another field at radio frequency (RF) is applied in a plane X,Y, normal to the first field the nuclei may resonate and absorb energy. In consequence, the resultant spin vectors of the nuclei rotate away from the direction Z of the first field towards the plane X,Y at right angles, ie the plane of the RF field. An RF field pulse which causes rotation of the nuclei fully into the XY plane, ie through 90° is called a 90° pulse. When it is required to examine only a thin slice of the body under investigation, the main magnetic field is given a gradient orthogonal to the slice (GZ in Fig 1A

of the present application) and an RF pulse H_1 is applied, the frequency being selected so that resonance occurs only within the slice. Due to the variation of magnetic field across the slice, nuclei at different positions across the slice rotate at different speeds and become scattered in phase. To correct this phase dispersal, ie to cause the nuclei to rotate together at the same speed and angle, the field gradient is then briefly reversed as shown at $G^1/2$. This technique, it is stated in the present application, gives rise to problems under certain conditions, which it is the object of this invention to reduce.

In the present invention the step of rotating the nuclei into the XY plane is performed by two pulses 1,2 Fig 2, separated by a spin-echo pulse 3 which inverts the spins of the nuclei. The pulses are stated to be preferably approximately equal and to have a total effect equivalent to a 90° pulse (ie to rotate the spin vector through $\pi/2$ radians).

Claim 1 sets out these features, the reference to the two pulses of RF field being in the following terms:-

"the total field integral of the periodic field being sufficient to rotate the spin vectors of nuclei in the field through an angle of $\pi/2$ radians"

The application to amend seeks to delete "an angle of $\pi/2$ radians" and replace it by "a desired angle", thereby removing the restriction to an angle of precisely 90° .

The reasons given for making the request are that the restriction to $\pi/2$ radians is unnecessary and was due to an oversight on the part of the Agent.

Mr Pope argued in a letter (5 Dec 83) and at the Hearing that the amount of spin vector rotation does not matter, that there is nothing in the specification to indicate that the invention will only work if the amount of spin vector rotation is $\pi/2$, and consequently the requested amendment does not result in added matter.

However, there can be no doubt that the specification was drafted with only this angle of $\pi/2$ radians in mind. It is specifically mentioned, in the specification as filed, at line 32 of page 7 and lines 6-11 of

page 8 as well as in claim 1 and the corresponding Statement on page 3 and no other angles are mentioned or implied. Although it may be deduced by the skilled man that the angle of $\pi/2$ is not critical to the functioning of the invention, the specification teaches only a method restricted to this angle. In my view, therefore, it would extend the disclosure to introduce the possibility of amounts of rotations greater or less than $\pi/2$, this being the effect of the requested amendment. In Protoned BV's Application (1983 FSR, page 110) it was decided that the deletion of a restriction (in that case the word "compression" qualifying a spring) was a notional addition to the body of the specification of all other types of spring and therefore prohibited by Section 76 as extending the disclosure.

Mr Pope also argued that the problem addressed has nothing to do with $\pi/2$, and that the passage on page 2 at line 16 makes no mention of $\pi/2$. This passage outlines the NMR method disclosed in prior specification 1,584,948 which, as Mr Pope pointed out, clearly envisages angles other than $\pi/2$ (for example at page 4 line 52 et seq).

Similarly, Mr Pope argued, the solution to the problem outlined in specification 1584948 has nothing to do with $\pi/2$ and if the RF pulse is restricted to $\pi/2$ it does not solve the stated problem, except in this special case. Although I agree that the problem addressed exists whether the angle in question is 90° or some other angle, the present specification is clearly restricted to the case where it is 90° and it therefore leaves the problem unsolved where the RF pulse is less or more than 90° . This may well not have been the intention, but it is certainly the clear effect of the present specification.

Mr Pope also pointed to the passage at line 11 on page 8: "In general if pulse 1 is a $\delta\pi/2$ pulse then pulse 2 should be $(1 - \delta)\pi/2$ where the maximum correction is obtained as $\delta \rightarrow \frac{1}{2}$."

The word "if", he argued, indicates that none of what follows need be true, in particular the value $\pi/2$ is a mere example, and any other angle will do. However, on a commonsense reading of this sentence I consider the word "if" refers only to the size of the first pulse and the statement means that the first and second pulse must together total $\pi/2$, as in claim 1.

Therefore, sympathetic though I am to the applicants' wish to remove what

they regard as an unnecessary restriction from the invention, I can find no grounds for believing that such removal would not extend the disclosure. In view of the prohibitions of Section 76(2)(a) of the Patents Act it follows that I have no alternative but to refuse the request.

A notice of appeal from this decision to the Patents Court may be filed within a period of 6 weeks from the date below. If no appeal is filed in that period, the application will be forwarded to grant in the normal way in its unamended state.

Dated this 26th day of January 1984

J F ELLIOTT
Principal Examiner, acting for the Comptroller

THE PATENT OFFICE