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IN THE HIGH COURT OF AUSTRALIA

N. V. PHILIPS' GLOEILAMPENFABRIEKEN

*V.*

THE COMMISSIONER OF PATENTS

ORIGINAL

# REASONS FOR JUDGMENT

*Judgment delivered at* MELBOURNE

*on* TUESDAY, 18TH MARCH, 1958.

W. M. HOUSTON, Govt. Print., Melb.

C.1978/55

N. V. PHILIPS' GLOEILAMPENFABRIEKEN

v.

THE COMMISSIONER OF PATENTS.

ORDER

Appeal allowed. Order that the Commissioner accept the application and specification lodged by the appellant on the 20th December 1951.

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JUDGMENT TAYLOR J.

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This is an appeal pursuant to s. 47 of the Patents Act 1903-1950 from the refusal of the Commissioner to accept an application, accompanied by a complete specification, for letters patent for an invention with respect to improvements in or relating to magnet heads for use in conjunction with magnetic recording equipment. The application and specification were lodged on the 20th December, 1951 and after an examiner had reported adversely to the application various amendments were suggested by the appellant. Subsequently the Commissioner, after hearing the appellant, refused to accept the application and in doing so gave reasons why, in his opinion, neither the original specification nor the specification, as the appellant proposed to amend it to overcome the objections raised, could be regarded as acceptable.

Upon the hearing before me counsel were disposed, initially at least, to treat the appeal as if it were limited to the question whether the Commissioner was wrong in refusing to accept the application supported by a specification amended in the manner proposed. But at the conclusion of the evidence - which dealt comprehensively with topics relevant to the matter generally - counsel for the appellant made it clear that he did not wish to abandon a claim that the original application should have been accepted and both the original specification and the proposed amendments were discussed at length. Upon reflection I am unable to see why, in the circumstances of the case, the whole matter should not now be regarded as open. In spite of the directions given on the 21st July 1955 the whole matter was, in effect, before the Commissioner when he gave his final decision and he was free, if he had thought proper to do so, to accept the application accompanied either by the original specification or by the specification as the appellant proposed that it should be amended. I take the Commissioner's observation that, for the purpose of giving a decision, he "considered the specification

as including the amendments lodged up to that date" to mean that he treated the matter as one in which the appellant might, additionally, rely upon the suggested amendments and not that he proposed to limit his decision to the specification as amended. Indeed it is reasonably apparent that the Commissioner acted on this view for his observations specify the reasons why he considered the original specification was defective and should not be accepted. In the circumstances I am of the opinion that I am bound to consider whether the application in its original form was properly refused and, if so, whether the application with the amended specification should now be accepted.

For a proper understanding of the difficulties in the case it is necessary to make some reference to the nature of the invention and the problem which it was designed to solve. As already appears it relates to improvements in or in relation to magnet heads for use in conjunction with magnetic recording machines. It was known at the time of the application that magnetic recording machines, when constructed conventionally, ceased to function when very high acoustic frequencies were employed and the invention was designed to overcome the basic difficulty which resulted in failure when such frequencies were employed. The evidence given in the case shows that it was generally thought by those versed in the relevant art that the solution of the problem was to be found in the construction of the magnet cores in materials, otherwise suitable, which possess a high initial permeability, that is to say, a high capacity, after demagnetisation, to conduct small magnetomotive forces. It was also known that in the conducting of lines of magnetic force through ferro-magnetic substances energy losses are necessarily involved. One of the chief causes of such losses is the presence of "eddy currents". These currents are induced in ferro-magnetic metals by a fluctuating magnetic flux and they flow at random along approximately circular paths at right angles to the primary magnetic lines of force in the metal core of the magnet. To avoid or minimise energy losses so caused it

had become the established practice to construct the metal cores of magnets used for recording purposes from very thin laminations of some ferro-magnetic substance each lamination being electrically insulated from its neighbours. The construction of magnetic cores in this fashion minimised such energy losses and at the same time greatly reduced the substantial impediment to the primary magnetic flux in the magnet core which, in magnets otherwise constructed, resulted from "screening" caused by eddy currents. It seems that this method of construction was the most effective method devised for the purpose of overcoming these particular difficulties yet as already appears, it had not been possible to make any satisfactory use of magnetic recording machines at very high frequencies. Evidence concerning the state of the art was given by Mr Beard, an electronic engineer in the employ of the appellant, and I accept without question his testimony that at the time of the application limitations upon employable frequencies appeared to be inevitable since it was thought that they were inseparable from the magnetic and electrical characteristics of the only magnetic materials considered to be suitable for the construction of recording and reproducing heads, that is to say, substances having a high initial and maximum permeability.

The appellant's invention sought to overcome this difficulty by constructing magnetic heads of any one of the known "ferrites", that is, any substance having the general formula $MOFe_2O_3$, or, alternatively, $MFe_2O_4$, in which M stands for any bi-valent metal. Of the ferrites it seems that only those of cubic structure are useful for this purpose so that if a magnet head or core constructed in accordance with the invention is to function, M must, according to the evidence, be taken to represent magnesium, zinc, copper, nickel, iron, cobalt or manganese. Of these substances particular reference should be made to the zinc ferrite which appears to possess magnetic properties only under very special conditions.

It is important to observe at this stage that all the ferrite materials, when compared with magnetic materials conventionally used in the manufacture of laminated cores for magnetic recording purposes, are of low initial permeability. The initial permeability of conventional materials such as metallic soft iron and its alloys is said to range from approximately 2,000 to 100,000 whilst that of the cubic ferrites ranges from something under 20 to approximately 2,500. No doubt in comparison with other ferrites some ferrite materials may be said to possess a high initial permeability but in comparison with many magnetic materials the initial permeability of the ferrites is relatively low.

It should also be mentioned that at the time of the application Philips Electrical Industries Pty. Limited was the owner of the registered trade mark "Ferroxcube". The mark was registered in Class 5 "In respect of metal compounds, in particular including metal oxides, having magnetic properties used in science and industry; magnetic cores for use in electrical apparatus and instruments including wireless, telephone, telegraph, signalling and scientific apparatus". At the same time this company was engaged in manufacturing for sale four types of ferroxcubes - 1, 2, 3 and 4 - consisting, respectively, of copper-zinc, magnesium-zinc, manganese-zinc and nickel-zinc ferrites. These, the subject of a costly manufacturing process, were apparently thought to be suitable for the inventor's purposes.

Accepting Mr Beard's evidence as I do there can be no doubt that the employment of cubic ferrites in the manufacture of magnet heads for recording purposes represented a revolutionary step in the solution of a problem which was known to exist by persons skilled in the art and there is no reason to doubt his statement that when he read the basic specification he was amazed at the simplicity of the solution. It seems that it was thought that the lamination of magnet cores had dealt as effectively as possible with eddy current problems

and, apparently, so it had as far as the magnetic flux in the magnet core itself was concerned. But what it appears to have escaped detection by those engaged in attempting to solve the problem was that when very high frequencies were employed eddy currents created "stray currents", or a "screen", in the vicinity of the two poles of the magnet and that this screen adversely affected the field of distribution at the gap between the two poles. To Mr Beard this was a "revelation" and it explained why, despite laminating, he had failed to make a recording head function at very high frequencies. Upon a consideration of the evidence I am satisfied that no reason exists for thinking that the application should have been rejected on the ground that the invention lacked novelty. The Commissioner, it may be noticed, made no finding on this ground though the objection that the invention was not novel was taken by the examiner. I cannot help but feel that no such objection would have been taken if the Patents Office had had the benefit of all the evidence given in the course of the appeal and of the careful analysis which was made by counsel appearing in the case.

The grounds upon which the Commissioner reached his decision related to the form of the specification both in its original and amended form and it is essential, therefore, to refer to the material portion of these instruments. In the original specification it was said that with the magnet head according to the invention the previously specified desiderata are met in a more satisfactory manner due to the fact that at least the ends of the core which constitute the gap are made of ferrite material known as 'ferroxcube', 'ferrite material' being understood to mean here material substantially constituted by substantially uniform crystals of a compound $MFe_2O_4$, where M designates a bi-valent metal such as for example Cu, Mg, or Mn or substantially uniform mixed crystal of these components. The use of this material in manner indicated not only enables the ends of the core to have a high resistence to wear and initial permeability but also has the advantage that in the immediate

proximity of the gap, where the highest field concentration is found comparatively low iron losses occur". After pointing out that "ferroxcube" can be used as a trade mark with any metal compound having magnetic properties the Commissioner expressed the view that the phrase "ferrite material known as ferroxcube" appearing in the basic and original specification can only be construed to mean any ferrite material. The expression "known as ferroxcube" did not, he thought, place any limitation on "ferrite material" and, in the result, claims were made which were too wide. In attempting to overcome this objection the appellant proposed to amend this portion of the specification so as to read

> "with the magnet head according to the invention, the abovementioned desiderata are met in a more satisfactory manner due to the fact that at the least the ends of the core which constitute the gap are made of ferrite material known as 'ferroxcube' and which at the convention date of the application comprised substantially homogeneous crystals and mixed ferrites of Zn with Mn or Ni. Ferrite material is to be understood to mean here material substantially constituted by substantially uniform crystals of a compound $MFe_2O_4$ where M designates a bi-valent metal such as for example Cu, Mg or Mn or by substantially uniform mixed crystals of these components. The use of this material in manner indicates not only enables the ends of the core to have a high resistence to wear and a high initial permeability but also has the advantage that in the immediate proximity of the gap where the highest field concentration is found, comparatively low iron losses occur".

The result of the proposed amendment, which, in the first instance, limited the choice of ferrites to the manganese-zinc and nickel-zinc ferrites, and of corresponding amendments to the claims, was, the Commissioner thought, to claim an invention which was not disclosed in the original or basic specification. The more general language of the concluding paragraph of the body of the amended specification and of claims 2 and 3 introduced further difficulties but in view of the opinion which I have formed of the case it is not necessary for me to discuss them.

As I read the Commissioner's decision the original specification was defective in that the expression "known as ferroxcube" did not place any limitation on the meaming of "ferrite material". It may well be that this was so and that the expression "ferrite material" must be understood as a reference to all materials "substantially constituted by substantially uniform crystals of a compound $MFe_2O_4$, where M designates a bi-valent metal, such for example as Cu, Mg or Mn or by substantially uniform mixed crystals of these components ". But the language of the specification was, I think, sufficient to indicate to a person skilled in the art that the reference to ferrite materials was intended to denote the cubic ferrites only and this conclusion is perhaps assisted by the expression "known as ferroxcube" (see New Developments in Ferromagnetic Materials - J. L. Snoek 2nd ed. at pp. 68 and 69). I do not think that the Commissioner thought otherwise, his objection to the specification in its original form being that it refers to all ferrite materials including some "which were obviously unsuitable for the purpose, such as, for example, the ferrites described by Hilpert in 1909 in German specifications Nos. 226,347 and 227,787 which the Attorneys admit have an initial permeability by about 30". The conclusion that ferrites having such a low initial permeability are unsuitable for the purposes of the invention is not, however, borne out by the evidence; on

the contrary it appears that ferrites have been developed which have an even lower initial permeability than 30 and they are not unsuitable for use in accordance with the invention. The evidence shows that all of the cubic ferrites may be employed though their effectiveness will depend upon the frequencies employed and, in the case of the zinc ferrite, upon the creation of very special conditions. Accordingly, it was said that in relation to some ranges of high frequencies the ferrites which will produce satisfactory, or the most satisfactory, results are those which may be said have a relatively low initial permeability even when compared with those mentioned by the Commissioner as being unsuitable whilst, in relation to other ranges of high frequencies, other ferrites having a relatively high initial permeability will be more suitable.

The result of this is that the original specification must be taken to specify cubic ferrite materials. The bi-valent metal component may consist of any one of seven elements or the ferrite may be constituted by substantially uniform crystals of the previously specified components. Further, the evidence denies the statement of fact upon which the Commissioner's decision that the original specification was too wide depended, namely, that the claims included ferrites which, because of their relatively low initial permeability, "were obviously unsuitable for the purpose". Indeed, Mr Beard made it clear that ferrite materials having an initial permeability of much less than 10 were the most suitable when dealing with frequencies of the order of 1000 megacycles. In these circumstances I am unable to agree that the specification is imprecise in this respect or that it specified ferrites, which because of their low initial permeability, are unsuitable for the purposes of the invention.

Upon the appeal the further objection was taken that the zinc ferrite must be regarded as unsuitable for use in accordance with the invention. Zinc, it was asserted, is

not magnetic except at temperatures of minus 100 to 200 degrees centigrade and is, therefore, useless for the purpose of the invention. But there appears to be some uncertainty concerning the properties of this ferrite and conflicting statements have been made from time to time concerning its electrical and magnetic properties. What does appear, however, is that the addition of zinc to some of the other ferrites results, for reasons apparent in the evidence, in an overall increase in the magnetic properties of the admixture at normal operating temperatures and, further, that such an admixture is calculated to secure optimum results at certain frequencies. It is true as counsel for the Commissioner said, that the specification does not tabulate the composition of ferrites best suited for use at specified frequencies but in my view it was unnecessary that this should be done. Nor, in the circumstances disclosed by the evidence, does the inclusion of the zinc ferrite constitute a sufficient ground for refusal of the application.

Finally, a further objection was based upon the statement in paragraph 3 of the original specification that in constructing magnetic heads "it is desirable that a material of high initial permeability should be used". This statement is said to be misleading. Indeed, if it were understood to mean that it was essential in the manufacture of magnetic cores according to the invention that materials should be used which have, in a general sense, a high initial permeability, it would deny the possibility of using some, if not all, of the cubic ferrites. But when the specification is read as a whole it appears sufficiently clear that the use of materials having a high initial permeability was regarded as but one of the desiderata in the manufacture of magnetic cores for recording and reproducing purposes. According to paragraph 2 it is "desirable to minimise the losses in the circuit, inter alia, by proper choice and proportioning of the magnetic material". Thereafter, paragraph 3 refers to the desirability of using a material of high initial permeability. Finally, paragraph 4

points out that "it is desirable to minimise the wear of the head at the point of contact with the magnetic record material by maximum hardness of the material so that the cross-section of the magnetic circuit, and hence the inductance of the electric circuit, remains substantially constant". Reference is made in paragraph 5 to the standard practice of constituting magnetic cores by laminated metal "which results in a high initial permeability and in a reduction of the losses by the subdivision of the core". When the evidence concerning the qualities and characteristics of the cubic ferrites is borne in mind it is reasonably clear that paragraph 6 discloses to persons skilled in the art that each of the "abovementioned desiderata" cannot be fully met by the use of cubic ferrites but that, collectively, they are thereby met in a more satisfactory manner. "The use of this material in the manner indicated", it is said "not only enables the ends of the core to have a high resistance to wear and initial permeability but also has the advantage that in the immediate proximity of the gap, where the highest field concentration is found, comparatively low iron losses occur". The language of the specification is, no doubt, open to considerable criticism but in my view this objection should not be upheld.

In all the circumstances of the case I am of the opinion that the appellant was entitled to have the application, supported as it was by the original specification, accepted.