1936
Mar. 31,
April 1 & 2.
1937
July 17.

BETWEEN:

BOHN ALUMINUM & BRASS CORPORATION ..... } PLAINTIFF;

AND

OTTO CARTER BERRY ..... DEFENDANT.

Patents — Conflicting application for patents — Date of discovery of invention.

Plaintiff is the assignee of one, Nelson. Nelson and defendant working independently of each other, and of other persons, invented a method of constructing pistons for use in internal combustion engines. Nelson applied for a patent in the United States in June, 1923. He filed his application in Canada on December 5, 1925. Defendant made application for a patent in the United States on March 20, 1922, and in Canada on February 27, 1926. Certain claims in each application were declared in conflict by the Commissioner of Patents for Canada.

The evidence established that as early as May, 1918, and not later than February, 1919, Nelson had made a complete invention of the idea of controlling aluminum piston expansion and had so formulated that idea as to afford the means of making the invention defined in his claims, thereby anticipating Berry.

Held: That by the date of discovery of the invention is meant the date at which the inventor can prove that he has first formulated, either in writing or verbally, a description which affords the means of making that which he has invented. *Christiani and Nielson* v. *Rice* (1930) S.C.R. 443, followed.

ACTION brought before this Court, under section 44 of the *Patent Act,* for a declaration as to who, as between the assignor of plaintiff and the defendant, was the first inventor of the subject-matter of their applications for patent, in respect of which the Commissioner of Patents had declared a conflict.

The action was tried before the Honourable Mr. Justice Maclean, President of the Court, at Ottawa.

R. S. Smart, K.C. and *W. A. McRae* for plaintiff.

W. D. Herridge, K.C. and *E. G. Gowling* for defendant.

The facts and questions in issue are stated in the reasons for judgment.

THE PRESIDENT, now (July 17, 1937) delivered the following judgment:

This proceeding is one under s. 44 of the *Patent Act,* and the claims in the conflicting applications for letters patent relate to new and useful improvements in pistons.

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The first applicant was one Nelson of Detroit, U.S.A., assignor of the plaintiff, his application being filed on December 5, 1925, the other applicant, the defendant Berry, of Indianapolis, U.S.A., filed his application on February 27, 1926. Berry was the first of the rival applicants here to file an application in the United States in respect of the same subject-matter, which he did on March 20, 1922, while Nelson did not file in that country until June, 1923, some fifteen months later. Both applicants are mechanical engineers and it appears that the training and experience of each, prior to the alleged dates of their respective inventions, was largely associated with internal combustion engines and engine pistons, and consequently there is nothing strange in the fact that each of the applicants, quite independently of each other, and independently of other persons also it seems, came to direct their attention to certain improvements in pistons particularly designed for use in motor engines, and more specifically to means of controlling piston expansion, which pistons, then generally made of aluminum alloy, were well known to possess an undesired tendency to expansion under heat.

This matter is by no means free of quite substantial difficulties, as is very usual in cases of conflicting applications, because there is always involved the determination of the date of invention of rival inventors. The difficulties are enhanced here by reason of the fact that certain evidence taken in proceedings in the United States, relative to the same subject-matter in issue here, was, by agreement between counsel, put in evidence here without the calling of the witnesses who gave such evidence. In that jurisdiction, as I understand it, and contrary to the rule here, it is incumbent upon an applicant for a patent of invention, in order to secure priority over a rival applicant claiming the same invention, to establish not only that he was the first to conceive the alleged invention but that he diligently proceeded to reduce it to practice; an application for a patent is there treated as a constructive reduction to practice. Therefore the United States evidence was in part directed to the point of "diligent reduction to practice," and this tended in some degree to make that evidence confusing here. It will be convenient here to state that in the United States, the invention in question here was apparent-

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ly the subject of a prolonged contest in the Patent Office, in interference proceedings so-called, as to priority of invention between Nelson and Berry, and ultimately it appears to have been held, by the Court of Customs and Patent Appeals, a federal court, affirming the decision of the Patent Office Board of Appeals, that Berry was entitled to the date of September 28, 1921, for conception, and to the filing date af his application, March 20, 1922, for reduction to practice, while Nelson was given the date of April 8, 1921, for conception, and his filing date of June 5, 1923, for reduction to practice.

In Canada it is the first inventor who is entitled to a patent. In *Christiani and Nielson* v. *Rice* (1) the law upon this point is discussed at great length, and with great care. In that case the Supreme Court of Canada said:

> The holding here, therefore, is that by the date of discovery of the invention is meant the date at which the inventor can prove he has first formulated, either in writing or verbally, a description which affords the means of making that which is invented. There is no necessity of a disclosure to the public. If the inventor wishes to get a patent, he will have to give the consideration to the public; but, if he does not and if he makes no application for the patent, while he will run the risk of enjoying no monopoly, he will none the less, if he has communicated his invention to "others," be the first and true inventor in the eyes of the Canadian patent law as it now stands, so as to prevent any other person from securing a Canadian patent for the same invention. Coming now to apply these guiding principles to the facts of this case, we find that the commission evidence, taken in Denmark establishes that in 1921—almost a year before the earliest date to which Rice's invention can be carried back—Bayer conceived the idea, disclosed it to "others" (Maule, Jacobsen, Philipsen, Schnadorph), instructed experiments, made some on his own account and produced porous cement. Therefore, he had invented the process * * * * * * Bayer invented a new principle and a practical means of applying it. He "was not bound to describe every method by which his invention could be carried into effect." (Terrell on Patents. 7th ed., at p. 144). The conception of the idea "coupled with the way of carrying it out" (*Hickton's Patent Syndicate* v. *Patents, etc., Limited*) and "reduced to a definite and practical shape" (*Permutit Co.* v. *Borrowman*) constituted the invention of his process, which he communicated to others.

It will be obvious that what has actually occurred in the mind of an inventor is not of the slightest importance, or, as was laid down in *Permutit Company* v. *Borrowman* (2):

> It is not enough for a man to say that an idea floated through his brain; he must at least have reduced it to a definite and practical shape before he can be said to have invented a process.

(1) (1930) S.C.R. 443 at p. 456. (2) (1926) 43 R.P.C. 356.

The effect of the rule laid down by the Supreme Court in *Christiani and Nielson* v. *Rice* (1), I might point out, has since been modified by the enactment of s. 61 (1) of the *Patent Act*.

Certain claims in each application being declared in conflict by the Patent Office, and it seems to be conceded that they each define substantially the same invention, the issue for determination here is restricted to the question of priority of invention, as between each applicant, in respect of such claims. We are not concerned here as to whether or not the claims in conflict contain subject-matter and for which letters patent might be granted; we have to assume subject-matter in the case of each application because it is only the question of priority of invention in respect of the claims in conflict that has been put in issue, and upon that footing only was this matter heard.

It will be convenient now to turn to what appears to be the invention claimed by Nelson and by Berry. I think the substance of the invention of each applicant may be stated quite briefly, eliminating any detailed description of the manufacture of the embodiment of the invention, a piston. The pistons of internal combustion engines are, and were at the material time, usually made of aluminum alloy, or some nonferrous metal. The temperatures of both the piston and the cylinder vary under different operating conditions, and the metal of both expands as the temperature increases. The piston becomes hotter than does the cylinder wall, and therefore expands more, thus ordinarily making the clearance less in a hot than in a cold engine. When the coefficient of expansion is small, however, and is the same in both the piston and the cylinder, this difference in expansion may be kept within the allowable limits of the clearance variation. Thus when both the piston and the cylinder are made of cast iron it is not difficult to avoid at least the greater part of the troubles due to clearance. The advantages of pistons made of aluminum alloy over cast iron are that they are lighter, have a large coefficient of expansion, and are usually softer than cast iron so that in the event of trouble they are not so liable to score the cylinder wall; the clearance between the piston and the cylinder of an internal combustion engine must necessarily be kept

(1) (1930) S.C.R. 443 at p. 456.

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within close limits, but generally speaking such limits are definitely determinable. The disadvantages of non-ferrous metals in piston construction are due largely to their higher thermal coefficient of expansion. As Berry puts it, the piston that is a proper fit when the engine is at normal operating temperatures will be excessively loose when the engine is cold, and at the same time will be too tight when the temperature rises above normal. If the piston has the proper clearance when the engine is cold, it will become so tight that it will seize when the engine is in operation. The object which both Nelson and Berry had in mind by their inventions was to make possible the use of a non-ferrous metal piston and yet to eliminate or reduce to a minimum the disadvantages usually incident to non-ferrous pistons, such as excessive expansion upon heating.

A piston is comprised of what is known as the head and the skirt, the head being usually separated or spaced by a gap from the skirt, the latter preferably being divided in construction into two opposite segments or sections. Usually, the head is provided with an internal supporting or depending cross-rib, or web, the ends of which extend downward and form an integral part of what is known as the piston pin bosses located in the skirt, and which carry the bearings of the piston pin, the piston pin bosses being at about the centre of the skirt and extending inwardly and transversely some distance from the skirt wall. This description of the construction of a piston may not be entirely complete or accurate, or perhaps very clear, but I think it will suffice; the construction of a piston may of course vary considerably in detail.

Now, what both Nelson and Berry claim to have invented was a method of piston construction which would overcome the disadvantages I have mentioned, and what each has proposed, in the way of accomplishing that end, is the placing of metal struts, having a low coefficient of expansion, from one skirt segment to another, or from one side of the skirt to the opposite side, having their ends anchored to the opposite walls of the skirt, which walls are at that point thickened, and similarly connected with the pin bosses intermediately, that is, at or near the inner ends of the piston pin bosses, the purpose being to provide a relatively small diametrical expansion in a direction at right

angles to the axis of the piston pin, whereas the separated skirt segments permit circumferential expansion; the struts are provided with suitable openings or holes for the piston pins to pass through, the holes being sufficiently large so that the ends of the struts do not reach the bearing surface of the bosses. Referring more precisely to the material of the struts, and their form, Nelson suggests that preferably they be stamped out of sheet nickel-steel and have a central opening into which a number of tongues extend, these tongues serving to permit the metal to shrink tightly on each tongue while the boss contracts in the mold. At their opposite ends each strut has a plurality of fingers by means of which they are firmly anchored or connected to the skirt portion of the piston. Fig. 5 of Nelson's drawings shows the construction of the struts. Preferably also the struts have a plurality of apertures at the points indicated by the numerals 19 in fig. 5 of the drawings. Each strut, at the one side of the piston, may be made up of two or more stampings, tubes or bars, and each set so formed may be placed out of a common plane. The planes of one set may be parellel or non-parallel to the planes of the other set of struts, on the other side of the piston. Berry suggests that the struts be made of corrugated sheet metal, extending from one skirt segment to the other, and connected to the piston pin boss intermediately. The ends of the corrugated struts are to be embedded in the vertically extending thickened portions of the skirt segments, and a middle portion embedded in circumferential ribs at or near the inner ends of the piston pin bosses, which Berry refers to as the wrist pin bosses. The corrugated struts are to have suitable openings through them, at the piston pin bosses, for the piston pins to pass through, the holes being sufficiently large so that such corrugated portions do not reach the bearing surfaces of such bosses. Berry also states that he prefers to use steel, or some strong metal, which has a coefficient of expansion not greater than that of the metal of the cylinder, and materially less than that of cast iron. He also states that he prefers that the sheet steel, from which the struts are to be made, be "corrugated for greater strength," an effect which of course would be well known.

The Commissioner of Patents has declared a conflict between claims 1 to 34 inclusive, and claims 37 and 38, of

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Nelson's application, and claims 1 to 6 inclusive, and 12 to 41 inclusive, of Berry's application. Each applicant claims that he is entitled, as against the other, on the ground of priority of invention, to those claims mentioned in his application and which are said to be in conflict with certain claims in the other application. Claim 1 of Nelson, a broad claim, may be referred to, and it is as follows:

A piston comprising a head, portions depending from the head and having piston pin bosses formed therein, a cylinder-bearing portion separated from the head by a slot, and struts of material different from that of the skirt, said struts contacting with the depending portions and with the cylinder-bearing portion.

Claim 6 is as follows:

A piston comprising a head, piers depending from the head, piston pin bearings formed in the piers, cylinder-bearing portions formed of relatively lightweight material, and struts extending between the cylinder-bearing portions, said struts being of less expansible material than the bearing portions and having their intermediate portions embedded in the piers and their ends having a cast-in joint with the cylinder bearing portions.

Claims 1 to 6 and 19, of Berry's application, are as follows:

(1) A piston, comprising a head-part, wrist-pin bosses rigidly connected to said head-part, skirt segments spaced from said wristpin bosses, and members made of a metal different from said skirt segments and each connecting said skirt segments together and to said wrist-pin bosses and controlling the spacing between said skirt segments.

(6) A piston, comprising a head-part of non-ferrous metal, wrist-pin bosses rigidly connected to said head-part, skirt segments spaced from said wrist-pin bosses, and members made of sheet metal connecting said skirt segments together and to said wrist-pin bosses.

(19) In a piston, a head, a separate skirt of material having a high coefficient of expansion, and transverse struts of less expansible material arranged as chords of circles intersecting the cylinder, said struts connecting opposite sides of the skirt, substantially as set forth.

These rival claims are clearly in conflict, and it seems to be agreed that the other mentioned claims are equally in conflict.

Mr. Smart, on behalf of the plaintiff, contended that May 8, 1918, was the date of Nelson's invention, or at least some date prior to any Berry could claim as the date of his invention; the earliest date of invention claimed for Berry is January, 1921. The debate in respect of the contention advanced on behalf of Nelson's alleged date of invention arises largely from the fact that the proof rests very largely upon sketches and memoranda which Nelson recorded in pocket note books or diaries, and which he never disclosed to others. However, Mr. Herridge agreed that the veracity

of Nelson, who appeared before me, in respect of his evidence concerning the sketches and memoranda made in his diaries, and elsewhere, was not to be questioned; likewise Mr. Smart agreed that the evidence of Berry given in the United States proceeding, in respect of certain disclosures of his invention to others, was not to be challenged. We will therefore first consider the evidence of Nelson, and others, adduced in support of the plaintiff's contention that Nelson was the first to make the invention in question.

After graduating from the University of Illinois, as a mechanical engineer, in 1916, Nelson became employed, as an experimental engineer, with the Premier Motor Corporation, in Indianapolis, U.S.A., his duties there being largely concerned with the development of motors. One of the chief problems at that time confronting Premier Motor Corporation derived from the fact that when the motors were cold the piston would slap, which was a very detrimental thing, and if the clearance in the cylinder were too small the piston would stick in the cylinder, when the motors became hot; this was common to all types of aluminum pistons. In June, 1917, Nelson entered war service with the United States Government, his duties there relating chiefly to guns, motors and aeroplanes, and in that service he remained until January, 1919, when he resumed his employment with Premier Motor Corporation; there he remained until late in 1922 when he went into private practice at Indianapolis, in which he continued until 1924, when he joined the plaintiff company with which he is to-day. While in the service of the United States Government he took part in the development of a piston in which the skirt was tapered from the centre upwards, to allow for a little more expansion at the top where the piston was hottest, which partly overcame the trouble, but he learned that additional means of controlling expansion of the piston skirt was required. During his war service Nelson conceived the idea of using in aluminum pistons, steel struts placed across the piston and of a material having a lower coefficient of expansion than aluminum alloy, and he made sketches and notes of his idea of such a piston structure, and he discussed the same with others. This began in 1918. These sketches show steel struts placed across the

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skirt of a piston to control expansion, some being placed on the centre and some off the centre, and he also sketched curves showing the theoretical work underlying the general mechanical considerations of piston construction; in the early stages his idea was to start out with a steel strut across the centre of the skirt and to work out the expansion by moving the struts farther and farther apart, to show the effect of expansion upon the piston.

The earliest sketches and notes made by Nelson appear in his 1918 pocket diary, under the date of May 8, of that year. One sketch, in pencil, shows a piston with a head, two piers depending from the head, and in these piers, in the piston skirt portion, the piston pin bosses are formed. So far this construction was old and well known. Depending from the pier and extending across the piston skirt, the sketch shows a steel member called a "strut," which is anchored to the opposite walls of the skirt, and to the pier and bosses at the centre of the strut. Significant notations relevant to this sketch are: "Aluminum steel-alloy piston expansion controlled," and, "With steel in the struts as used at Illinois Lab. extensometers would perhaps work fine. The cost would be high for invar." Invar is a special nickel-steel, with which Nelson was acquainted at the time and which was known to have a low thermal expansion. Now this steel strut, compared with aluminum alloy would have a low coefficient of expansion and therefore would control, in some degree or other, expansion of the skirt under heat. The sketch also shows dovetailed indentations or fingers at the ends and centre of the strut; this is shown very clearly in fig. 5 of Nelson's patent application drawings and in exhibit 31. The purpose of the fingers is to permit the aluminum alloy of the piston itself, when being molded, to flow between the fingers of the strut and thus give a tighter joint or bond between the steel and the aluminum; another sketch, on the same page of the diary, shows the fingers at the ends of the strut to be bent inwardly, the purpose being to increase further that bond. The sketch of this strut, it will be seen, shows four holes or circles and Nelson explained that this was for the purpose of lightening the strut, and "to form a convenient location of the strut in the mold when casting," which I understand to mean that the holes are also de-

signed to position the strut in the mold before the casting of the piston. There are also the notations: "slot may be cut on one side only," "saw cuts," and "relief only if desired," which merely indicate that the outside diameter of the skirt might be slotted or cut in different ways to relieve expansion of the piston skirt, which, as I have already mentioned, expands faster than the walls of the cylinder, and any relief of this nature would tend to avoid scoring or unusual friction between the piston skirt and the cylinder.

Another sketch on the left hand side of the same page, and also made on May 8, shows much the same thing as the first sketch, though in some details the construction varies. Nelson testified concerning this sketch that

> the strut has been lightened slightly more than in the previous sketch by making a large hole through the centre of the strut and having a top member and a lower member. Each member is cast into the pier extending from the head past the pin bosses down to the bottom of the skirt. The upper and lower members of the struts have fingers projecting from the same which are intended to make a better joint between the aluminum and steel.

A notation relevant to this sketch states: "Strut cast in place—low coef. of exp. material." It was explained that this means that the strut could be made of ordinary carbon steel or steel with various amounts of coefficient nickel, and that the strut would be put in place in the mold and that the aluminum alloy, in the molding state, would sink around the strut. Another sketch on the same page of the diary shows what is called a "vector diagram"; this indicates theoretically the forces exerted on a strut controlled piston, and by such a diagram it seems the final result in expansion, which is made up of several different components, may be determined. That sketch is also dated May 8, 1918, and is authenticated by the signature of Nelson. Another vector diagram appears on the next page of the diary with a notation immediately below stating, in part, that the spacing of the struts will have to be worked out, in order to get the proper or desired expansion result, On the next following page is a sketch showing a single strut in a piston, and the possibility of using an adjustable strut. The diary contains several other sketches with related notations showing various forms of a steel strut piston, modifications of the first and second sketches. Then there is Nelson's diary for 1919 in which is recorded other sketches

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showing various features of a strut controlled piston, and also curve sheets showing various calculations for coefficients. It is not necessary I think to describe these sketches as they merely show modifications of the principle of a strut controlled piston, earlier shown.

After Nelson returned to the Premier Motor Company, early in 1919, he continued his work on the problem of controlling the expansion of pistons by means of steel struts and he states that, in February, 1919, he made a drawing disclosing a structure embodying substantially the invention described in his patent application, and, as Nelson stated in his evidence, it is quite clear from the general theory worked out by the vector diagrams, that there was a wide field in which one might work, starting with a strut in the centre of the piston. Experimental or working pistons were made, in February or March, 1919, from castings on hand in the Premier Motor Company plant, secured together instead of casting them in place, according to the drawing just referred to, and which is now exhibit 7. This exhibit is a blue print of an aluminum piston that the Premier Motor Company was producing at the time, and superimposed upon that blue print is a pencil drawing, made on February 25, 1919, showing all the changes in detail required to make working pistons; this modified drawing is sketched in Nelson's 1919 diary, and there are notations relevant to actual experiments made with the working pistons constructed according to the modified blue print, exhibit 7. The working pistons were tested with a single strut, and with four struts. Exhibit 8 is a drawing showing more clearly the Premier Motor Company's blue print piston as modified by the pencil alterations superimposed thereon. This exhibit shows a piston with four steel struts, the head separated from the skirt by horizontal slots, and the skirt in segments; the drawing shows that the two steel struts at the top of the skirt are anchored at the ends of the skirt only, and the two lower struts show them screwed into the skirt at the ends and screwed into a lug depending from the piston pin bosses, or partly screwed into the boss or lug depending from the boss; exhibit 7 also shows a piston with a single strut at the upper end of the skirt screwed in place. The piston drawing on exhibit 7, and as shown on exhibit 8, would have the same function

as that shown in Nelson's earliest diary sketches, made in May, 1918. The working pistons made according to this drawing showed results in agreement with the general theory worked out on Nelson's curve sheets; Nelson states that his tests of the working pistons—engine tests I think—having two struts and four struts were satisfactory; the piston having four struts apparently showed more expansion than the one with a single strut in the centre of the piston. Later, the Premier Motor Company, in May, 1920, started to make actual samples of pistons with a single strut in the centre, as it was then thought that this form would give the most satisfaction. A sketch was made by Nelson of the actual work on a single strut piston, when explaining to his assistant, a Mr. Nutt, the general theory of pistons, the single strut and multiple strut, and the object of controlling expansion. That sketch, exhibit 9, made on April 8, 1921, relates to two different pistons, one with a steel disc strut, the other it is claimed, being substantially the same as that shown in Nelson's diary sketch of May 8, 1918. The latter sketch, in the upper right hand corner of the exhibit, shows a cross section of a piston through the pin bosses, and a side view showing the ends of the struts, the struts showing fingers at their ends. In the lower part of the cross section the fingers are shown bent towards the centre of the piston at the ends of the strut, and at the centre of the strut which is cast into the bosses the fingers are shown bent away from the centre of the piston to give a good bond or anchorage of the steel into the aluminum bosses and skirt. There are relevant notations on this sketch, exhibit 9. This sketch, Nelson states, was only intended to illustrate, during a talk or discussion with Nutt, some of the various types of pistons they would be considering in their development work. Nelson continued his development work, and later he applied for a patent in the United States, for his invention corresponding to the one here in question; he later interested the plaintiff corporation in that invention, and they proceeded to develop it commercially.

Reference must be made to certain evidence, tendered on behalf of the plaintiff, relative to disclosures said to have been made by Nelson of his invention, to others, and also evidence relative to the construction of experimental pistons

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embodying that invention, in the early part of 1919. Brown, a mechanical engineer, with considerable experience in automotive engineering, became acquainted with Nelson in March, 1918. In the latter part of May, 1918, Nelson discussed with Brown the matter of the control of expansion of aluminum pistons by means of struts to be placed at different distances from the centre line of the piston, which struts were to be made of steel of a different coefficient of expansion so as to control the amount of expansion of the pistons, which, to Brown, was then a novel idea. Brown states that while this discussion was in progress Nelson illustrated by a sketch his proposed construction of such a piston, and his recollection was that Nelson spoke of two steel struts, parallel to each other and to a centre line through the piston at right angles to the centre line of the piston pin, and he then understood Nelson to say that the spacing of the struts would have some effect on the functioning of the piston; Nelson mentioned to Brown that the strut material might be a steel having incorporated in its composition a large percentage of nickel, a material of this composition having a much lower coefficient expansion than ordinary steel. Nelson never showed his diary sketches to Brown, but the latter, upon being shown the sketches on the first page of Nelson's 1918 diary, stated that the sketch at the bottom of the right hand page, near May 10, resembled the sketch Nelson made before him. The witness Fox states that a few months after Nelson returned to the employ of the Premier Motor Company after the war, where Fox was also employed, Nelson worked on some aluminum pistons, other than those being produced by the Premier Motor Company, one of which had four steel screw struts across the skirt, two of them connecting the bosses, and two of them just above the bosses; and another piston had a single screw strut on the inside of the piston. Fox himself did some work on the four strut piston and he saw it before and after it had been installed and tested in a motor. At the same time to which Fox referred, one Hopkins, then also in the employ with Premier Motor Company, testified that Nelson designed and made two or three aluminum pistons with four steel struts, two above the boss and two screwed into the piston pin bosses, all the struts being at

right angles to the piston pin; these pistons were given motor tests and Hopkins saw them after they had been tested.

Nutt, a mechanical engineer, whom Nelson mentioned as having worked with him on experimental pistons made according to the sketches shown in exhibit 9, dated April, 1921, and which Nutt witnessed, also gave evidence, and he confirms in several respects the evidence of Nelson. Nutt stated that Nelson made many sketches for him, in May or June, 1920, on odd pieces of paper, showing how control of the expansion of aluminum pistons could be accomplished, for example, by the use of a single steel strut across the diameter of the skirt at right angles to the piston pin bosses, and similarly by two or more struts, the strut being composed of a material of a lower coefficient of expansion than aluminum alloy. The idea of casting the struts in place was discussed but it was deemed more feasible to make the first experimental samples by purely machine methods, as this work could be done more rapidly than the pattern equipment could be made for cast-in samples, but which Nutt himself knew from experience in other work to be feasible. Nelson showed him a vectorgraph of the expansions of the aluminum and the steel or nickel-steel alloys which might be used in the double strut type, and showed how it was possible to vary the magnitude of the resultant of these two expansions to almost any limit desired. Nutt became satisfied that the vector method of studying the expansion rate in composite pistons should be valuable, and as what might be expected in actual service. The witness Crawford, presently an engineer in the employ of General Motors Company, but in the service of Premier Motor Company from 1916 to 1919, stated that in September of 1918 Nelson explained to him in a general way his idea of the control of aluminum piston expansion, and that in the early spring of 1919 Nelson disclosed to him various means of controlling the skirt diameter of aluminum pistons. Crawford was shown sketches of pistons having steel strut bars which ran diagonally from the upper inside corner of the piston head down to the upper portion of the piston skirt on each side, also sketches of pistons with a strut bar located above the piston pin boss and having its axis on a line at right angles to the face of

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the thrust, this strut being anchored at each end of the thrust faces of the piston skirt, also sketches showing two pairs of struts which were at right angles to the face of the thrust, one pair being located well up in the upper portion of the skirt of the piston, the other pair being located below the piston pin boss. In the sketches of pistons with the strut located above the boss the strut was at right angles to the piston pin and was located on the centre line of the piston, which centre line was at right angles to the piston pin, and it extended from the centre of the thrust face from one side to the other. Crawford explained, much as did Nelson, how the struts were anchored. Crawford distinctly remembered, "just like it was yesterday" being shown the blue-print, together with pencil sketch thereon, exhibit 7, dated February 25, 1919, about the time Nelson disclosed to him his idea of controlling piston expansion. Nelson also suggested that the struts might be cast in place in the piston instead of being screwed into it. Then Crawford states that a set of four strut pistons was constructed in March, 1919, according to Nelson's sketch of February 25, 1919, exhibit 7, and the same was tested by Nelson in an engine, but he was not clear when a single strut piston which was made in accordance with the pencil sketch shown at the left of exhibit 7, was tested, but he thought at a date later than March, 1919.

After hearing Nelson's evidence, supported in so many particulars by his diary sketches and accompanying notations, by his curve sheets and pencil drawings, by the construction of his experimental pistons, and by his disclosures to others orally and otherwise, confirmed by several witnesses, I cannot but conclude that in May, 1918, and not later than February, 1919, Nelson had made a complete invention of the idea of controlling aluminum piston expansion by means of the use of steel struts, which would long anticipate Berry, and that by these dates he had so formulated that idea as to afford the means of making the invention defined in his claims, thus bringing himself within the rule laid down in the case of *Christiani and Nielson* v. *Rice* (1). The first two or three sketches in his diaries

(1) (1930) S.C.R. 443 at p. 456.

seem to me to disclose substantially the piston construction claimed in his patent application. These sketches show precisely what is found in Nelson's broad claim no. 1, namely,

> a piston comprising a head, portions depending from the head and having piston pin bosses formed therein, a cylinder-bearing portion separated from the head by a slot, and struts of material different from that of the skirt, said struts contacting with the depending portions and with the cylinder-bearing portion.

We also find in such sketches other features or elements, mentioned in other claims, such as claims numbered 12, 13 and 14. It seems to me that an engineer of relevant competency could construct the piston claimed by Nelson, from his earliest diary sketches of May, 1918, or from his drawing of February, 1919, from which he actually made working pistons. When once the object of the invention is stated, and the use of steel or nickel-steel struts is stated as the fundamental means for solving the problem of piston expansion, and the general method of construction is suggested, which Nelson in those sketches has shown, then, it seems to me that a competent engineer could construct the piston which Nelson claims in his patent application, and that is the only piston with which we are concerned. In the use of steel struts lies the essence of the invention. It is quite apparent, I think, that once the use of steel struts having a low coefficient expansion is seized upon, for the purpose of controlling piston expansion, there might be various embodiments of the idea or principle of construction defined in the claims of Nelson, depending on the amount of control required, and the details of the most efficient construction could be determined by a competent workman in the relevant art. The field was wide for variations in strut construction or employment, if I understand correctly what is shown by the vector diagrams of Nelson, but that I apprehend would not destroy the claim to invention in the broad principle of the use of struts for the purpose mentioned in the specification, and the construction thereof as defined in the claims of Nelson. I do not think, for our purposes here, there is any importance in the distinction between an "imbedded" strut and a strut connected by "screws," and the evidence shows that Nelson was aware that a piston might be cast with the strut first being

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positioned in the mould, and it seems to me that his earliest sketches disclose this construction.

It is understandable how Nelson might follow up his first conception of strut construction, by experimenting with variants of it, patenting some of them, and postponing application for the precise invention here in question. That does not mean that he thereby abandoned his first conception of construction, or that he treated the same as being something incomplete or impractical. It was necessary that he secure the co-operation and financial aid of some manufacturer, or other person, before he proceeded to exploit commercially his invention, and this frequently requires a great deal of time, and a great deal of persuasion. And it is always to be remembered in justice to inventors of some mechanisms, or some methods, that their final acceptance and adoption, in industry or commerce, depends upon the willingness of manufacturers, consumers or others, to depart from current practice or experience, and adopt something new, which frequently means a considerable expenditure of money and time. No very good reason was given by Nelson as to why he did not show to others his diary sketches, but I do not think that this is fatal; it would seem that he reproduced substantially the same thing when making the sketches which accompanied the oral disclosure of his invention to others, and whose evidence I have referred to. In any event, I do not think all the other evidence can be disregarded on this account.

The first disclosure of any kind which Berry made was to one Vesey, now deceased, late in June, 1920, and I would infer from his evidence, that he showed Vesey some sketches of his proposed improved piston, made a day or so previously, but which were not available for production in the United States proceedings. Upon the evidence, I should hesitate to hold that Berry had formulated his invention in June, 1920, and Mr. Herridge did not urge this upon me. The earliest date of invention seriously advanced for Berry, by Mr. Herridge, was January, 1921, by which time Berry, with the assistance of one Barnes, had prepared some charts presumably descriptive of his invention. By September 28, 1921, Berry had prepared a set of drawings of his invention, which he signed himself on that date, and Mr. Smart's submission was that in any event this was the

earliest date to which Berry was entitled, and much might be said in support of that view; but in my view of the case it is a matter of indifference whether the month of January, or the month of September, 1921, be accepted as the date when Berry first formulated his invention. Nelson, I think, is entitled to rely upon the date of May, 1918, or the date of February, 1919, both of which are prior to any date which Berry might fairly claim. Considering the evidence only of Nelson and Berry, which I am asked to accept as being reliable, and disregarding the question of the quantum or quality of evidence which a court should accept as proof of the date of invention prior to any application for patent, I entertain no doubt but that Nelson was the first to conceive the invention, the first to disclose it to others, the first to commit it to paper, and the first to make a physical working embodiment of it.

I am of the opinion therefore that the plaintiff is entitled to the claims which are declared to be in conflict with certain of Berry's claims, on the ground that Nelson was the first to make the invention. Cases where the actual dates of invention of rival inventors, working contemporaneously, are to be determined, are usually difficult, and this is not an exception, but the conclusion which I have reached is, I think, supported by the evidence, and by the law as laid down by the Supreme Court of Canada in *Christiani and Nielson* v. *Rice* (1). This case, like many others of the kind, emphasizes the idea so often expressed by those having to do with patent cases, namely, that it would be more satisfactory to all concerned, if the *Patent Act* went still further than s. 61 now goes, and enacted that as between two or more inventors of the same subject-matter, the monopoly shall go to him who first applies therefor and makes a contribution to the public by showing them how to practise the invention. The plaintiff will have its costs of the proceeding.

Judgment accordingly.

(1) (1930) S.C.R. 443 at p. 456.