BETWEEN:

NIAGARA WIRE WEAVING COMPANY LIMITED..... PLAINTIFF;

AND

JOHNSON WIRE WORKS LIMITED... DEFENDANT.

1938
Oct. 18-21, 24-27.
1939
May 17.

Patents — Infringement action — Subject-matter — Invention — Patent Act, R.S.C., 1927, c. 150, s. 50.

The action is one for infringement of three patents owned by the plaintiff. The inventions claimed in two of the patents relate to methods of joining the ends of a woven wire belt to form an end-

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less belt particularly for use in Fourdrinier paper machines. The invention claimed in the third patent relates to woven wire fabric that is used in the manufacture of belts for Fourdrinier paper machines.

The Court found that with respect to the first two patents the art of joining the two ends of a woven wire cloth by wire stitching as described in the patents was quite old and that the patents lacked subject-matter.

With respect to the third patent the Court found that there is no invention disclosed in the patent and also that the defendant had been making the wire belt claimed to have been infringed since a date more than two years before the application for the patent in question.

Held: That small variations from, or slight modifications of, the current standards of construction, in an old art, rarely are indicative of invention.

2. That under the Patent Act, R.S.C., 1927, c. 150, s. 50, the defendant is entitled to continue the manufacture and sale of its wire belt, having commenced the manufacture and sale of the same more than two years prior to the issue of plaintiff's patent.

ACTION for a declaration that, as between the parties to the action, three patents of invention owned by the plaintiff be declared valid, and to have been infringed by the defendant.

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

O. M. Biggar, K.C. and *R. S. Smart, K.C.* for plaintiff.
W. F. Chipman, K.C. and *G. F. Osler* for defendant.

The facts and questions of law raised are stated in the reasons for judgment.

THE PRESIDENT, now (May 17, 1939) delivered the following judgment:

In this action the plaintiff asks, *inter alia,* for a declaration that, as between the parties here, three patents of invention issued or assigned to it, pursuant to the Patent Act be declared valid and to have been infringed by the defendant.

The senior patent, No. 234,657, issued in October, 1923, on the application of Hamilton Lindsay, and by him assigned to the plaintiff. This invention relates to a method of joining the ends of a wire fabric to form an endless belt which is particularly useful in Fourdrinier paper machines. The next patent in point of date, No.

259,465, issued in March, 1926, on the application of Hamilton Lindsay, which was by him assigned to the plaintiff. The invention described in this patent relates to the same subject-matter as the one first mentioned. The last and junior patent, No. 332,216, issued in May, 1933, on the application of Hamilton Lindsay and Edward J. Buell, and which patent by assignment is now owned by the plaintiff. This invention relates to woven wire fabric that is used in the manufacture of belts for Fourdrinier paper machines.

I propose first to consider the junior patent, that is the patent applied for by Lindsay and Buell, and which relates to an alleged improvement in a belt for Fourdrinier paper machines. A Fourdrinier machine is a well known paper making machine. Belts of the kind in question, and as in use to-day, are composed of woven wire cloth of the order of fifty feet and upwards in length, with a width of from seven to twenty-five feet, and are woven as a single piece of cloth of the desired length and width from fine brass or bronze wires of a diameter of the order of ten one-thousandths of an inch, said by one witness to be about three times the diameter of a human hair, but that diameter may vary upwards and downwards. In any event there would be a very considerable number of warp and weft wires per square inch of the woven wire cloth. After the ends are joined together, and placed upon a Fourdrinier machine, the face or upper surface of the wire cloth or belt is used as a conveyor of paper pulp or stock which is fed upon it from a tank during the circuit of the belt, and this paper stock normally contains a considerable proportion of water. At a certain stage the paper stock is transferred upon the wire belt to felts, and then on through various stages of manufacture until the paper is completed. The paper stock before passing to the wire belt consists of very small wood fibres suspended in water and therefore the wire mesh must be very small otherwise the fibres would go through it, and yet the mesh must be large enough to permit of the escape of water. The drainage of water through the belt is accelerated by suction boxes over which the belt travels, the purpose being to draw the water out of the paper stock, through the belt, as it passes over the suction boxes. It is desirable that the paper web be

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formed as evenly as possible and therefore it is important that the surface of the belt should be as even as possible, so that the paper produced shall be constant in its characteristics from side to side and end to end. It is also desirable that the belt be strong because it is subject to great strain and wear while being driven around rollers in its circuit. I might also add that prior to 1920 Fourdrinier wire belts were run at a speed of the order of six hundred feet per minute, but the modern machine is run at a speed of the order of twelve hundred to fifteen hundred feet per minute. The life of a wire belt is comparatively short.

There are two principal weaves of wire cloth. In the first, the plain weave, the warp wire passes over a weft wire and then under a weft wire, and so on, that is, the warp wire passes alternately over and under a weft wire, and this is generally referred to as a one-one, or 1-1, weave. Then there is what is called the twill weave of which there are many varieties. In what is called a one-two, 1-2, twill weave, the warp wire would pass over one weft wire and then under two weft wires, and so on; in a one-three, or 1-3, twill weave the warp wire would pass over one weft wire and then under three weft wires, and so on. It might, of course, be a two-two, 2-2, weave, or something else. Both the plain and twill wire weaves have long been known and practised. It is the one-two twill weave that both the plaintiff and the defendant employ in the weaving of their Fourdrinier belts. This will afford a general description of the construction and purpose of woven wire belts used in the paper making industry.

The improvement claimed to have been invented by the plaintiff's patentees is substantially that of raising the weft wires in a woven wire cloth or belt to approximately the same plane as that of the warp knuckles, by the proper selection of weaves and wire sizes. This, it is claimed, gives a smoother and more even surface to the belt on which the paper stock is to be carried, and a more even surface to the paper itself; this also, it is said, avoids wire markings on the paper, which are liable to occur when the warp knuckle is on a substantially higher plane than the weft knuckle.

It will be useful now to turn to the specification from which we may obtain a more complete description of the invention claimed. The specification states:

This invention relates to woven wire fabric that is used in the manufacture of belts for Fourdrinier machines. The increased width of paper machines and the increased speed at which Fourdrinier belts are operated has necessitated greater tensile strength in the belts. Such development has been gradual, and as a result the meshes of Fourdrinier wires have become more and more rectangular with a greater difference between the warp and weft count per inch, as heavier sizes of wires are incorporated into the web.

This development has continued over a long period of years until at the present time sixty mesh fabric is now commonly made of sixty warp wires to the inch and forty weft wires to the inch. Furthermore, the warp wires having a diameter of ·009 inch, while the weft wires have a diameter of ·010 inch. This resulted in a mesh opening of ·015 inch long and ·008 inch wide. Another arrangement which gives equivalent drainage with greater strength and durability utilizes fifty-five warp wires to the inch and thirty-six weft wires to the inch, using a warp wire of ·010 inch in diameter and a weft wire of ·011 inch in diameter, and providing a mesh opening of ·017 inch by ·008 inch. A further consideration in paper making belts is that the pulp is supported by the tops of the warp knuckles without adequate support from the weft-wires, except by forming deep depressions in the web of paper. These depressions do not exist on the top side of the sheet so that there is a pronounced difference between the two sides of the sheet. Efforts have been made to eliminate this objectionable feature by rolling the belt or grinding off the knuckles of the fabric, but these processes cannot be accomplished without seriously interfering with the flexibility and durability of the belt.

It will be observed that the patentees refer to the tops of the warp knuckles causing depressions in the web of paper and that this was sought to be eliminated by rolling the belt, or grinding off the knuckles, but this they say could not be done without seriously affecting the flexibility and durability of the belt. The specification proceeds:

We propose to eliminate the objections inherent in the projecting warp knuckles by raising a crimp on the weft knuckles, so as to bring the top of the weft knuckles substantially in a plane with the top of the warp knuckles, and we propose to accomplish this during the weaving operation by the proper selection of weaves and wire sizes. This effectively reduces the depth of the wire marks and enables the smaller depressions to be more easily smoothed out on the presses of the paper machine. This method is well adapted for the use of a twill weave wherein the short knuckles are disposed on the top of the cloth and the long knuckles are disposed on the bottom of the cloth. Furthermore, this method enables me to reverse the tendency toward more rectangular meshes, and to make the mesh opening more nearly square, and still use the multiple or twill weave.

The high rate of speed at which Fourdrinier machines are operated at the present time also increases the difficulty of the belt to hold the

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pulp, for the belt has a tendency to creep with reference to the pulp. It is an object of our invention therefore to so weave the fabric that the warp wires are spaced farther apart, thus allowing more room for the weft knuckles and permitting the weft knuckles to be raised above their previous position. This, in effect, provides a series of steps which extend across the belt and thereby serve to keep the pulp more securely in contact with the belt while the sheet is being formed. We have found that this operation can be satisfactorily accomplished if the top of the weft knuckles lie substantially in the plane of the top of the warp knuckles.

* * *

We have found that satisfactory results can be obtained if a fabric embodying our invention is made by using a warp wire of ·010 inch in diameter and a weft wire of ·009 inch in diameter, with 55 warp wires and 50 weft wires to the inch. This arrangement is satisfactory in twill weaves to replace a sixty by forty mesh fabric having a plane weave.

Apart from the advantages of greater durability and less wire marks, which are obtained with this arrangement, we have found that the twill weave can now be used for the manufacture of fine grades of paper, whereas heretofore they have been limited to the manufacture of relatively coarse paper. This result follows by reason of the fact that the weaving provides a relatively square mesh, which will not lose so much fine stock during the formation of the web. Furthermore, a twill weave provides a longer life for a belt when used in the manufacture of fine papers.

Then the specification further states:

. . . . the size of wires should be chosen to make the top of the weft knuckles lie in substantially the same plane as the top of the warp knuckles.

While we have used the phrase "the tops of the weft knuckles and the tops of the warp knuckles lie substantially in the same plane" it is to be understood that if desired, the plane of the tops of the weft knuckles may be disposed somewhat higher or lower than the plane of the tops of the warp knuckles and still be within the spirit of our invention. We believe however, that in order to minimize the two sidedness of a sheet, the plane of the tops of the weft knuckles should not be disposed out of the plane of the tops of the warp knuckles, in the finished cloth a distance that exceeds half the normal diameter of the warp wire.

Claims 1 to 7 of this patent which are said to be infringed would appear to cover any twill weave wherein the weft knuckles are raised, in the weaving, substantially to the plane of the warp knuckles. Claim 3 is typical and is as follows:

3. A Fourdrinier paper making wire fabric having warp wires and weft wires woven into a twill weave, wherein the warp wires have long knuckles and short knuckles, and the warp and weft wires being so positioned with reference to each other during the weaving operation that the tops of the weft knuckles and warp knuckles lie substantially in a common plane.

It will be seen from the specification that the plaintiff's manufacture of a wire belt for a Fourdrinier machine is

of the one-two twill weave, wherein the short knuckles are disposed on the top of the cloth and the long knuckles are disposed on the bottom of the cloth, and that the warp and weft wires are so positioned with reference to each other during the weaving operation that the tops of the weft knuckles and warp knuckles lie substantially in a common plane. This it is stated serves to keep the pulp more securely in contact with the belt while the paper web is being formed, to reduce the depth of the wire marks, and to enable the smaller depressions to be more easily smoothed out on the presses of the paper machine.

The defendant's case is (1) that the plaintiff's patent is void for want of subject-matter and that in view of the state of the art it was not invention to do what the patent discloses; (2) that any invention therein had been disclosed in prior publications; (3) that the plaintiff itself made public any invention disclosed in the patent by the manufacture and sale of woven wire belts substantially as described in the patent in suit, more than two years before the date of the application for the said patent; (4) that the defendant had manufacured and sold, more than two years prior to the date of the application for the plaintiff's patent, precisely the same manufacture of woven wire belts as that which is here said to infringe the plaintiff's wire belt; and (5) that under s. 50 of the 1927 Patent Act, even if there were infringement, the defendant is entitled to continue to manufacture and sell its wire belt, having commenced the manufacture and sale of the same before the issue of the plaintiff's patent.

The wire belts first manufactured by the plaintiff were of a plain weave. In 1921, it experimented with a variety of twill weaves and ultimately made a selection of a one-two twill weave, and it commenced producing such a twill woven wire belt, to which it gave the name "long crimp." It found that this weave of wire belt gave a relatively uniform surface and was much stronger than that of the plain weave. Mr. Buell, then in the service of the plaintiff company, and a joint inventor with Lindsay of the patent under discussion, thought this twill weave an important forward step and he and his associates then believed that they were the first to develop and use it. In due course Lindsay or Buell, or both, applied for a patent in the United States for the long crimp wire belt,

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but the application was refused by reason of a patent granted to Kufferath, a German, in 1899. The applicant or applicants submitted to the ruling of the United States Patent Office, but it would appear that the plaintiff continued to manufacture its long crimp wire belt. It will be desirable now to examine the Kufferath patent, because it is admitted that this patent disclosed and described the plaintiff's long crimp wire belt.

The United States patent to Kufferath, No. 617,581, states that the invention related to a woven fabric adapted especially to the wire fabrics used in the paper-making art to carry the films of stock or pulp. The specification states:

> The fabric is constructed with the warp-threads *a* woven with the weft-threads *b* in such a way that (referring to the top of the fabric, as in Fig. 1) the warp-threads *a* pass under two of the weft-threads *b*, then up over one of the weft-threads, and then down under two of the weft-threads, and so on throughout the fabric. This causes the weft-threads to be passed under one of the warp-threads, then over two, then under one, and so on throughout the fabric. The bottom of the fabric has a reversed appearance, as may be seen in fig. 2. Here the warp-threads are passed under one of the weft-threads, then over two, then under one, and so on, and the weft-threads are passed under two of the warp-threads, over one, under two, and so on. The result of this construction is that the bottom of the fabric (see fig. 2) presents to the rolls and drums on which the fabric runs more of the warp-threads than of the weft-threads and also greater lengths of the warp-threads without the usual number of sharp bends in the warp. This renders the fabric more durable in that the action of the rolls on the fabric does not wear away the warp-threads so quickly. The top surface of the fabric presents a uniform and regular surface to the paper-stock, and thus avoids marking the final products of the paper-making machine.
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> If desired, the durability of the fabric may be further increased by using warp-threads of greater thickness than those of the weft. This is so because the warp-threads are principally exposed to the rolls of the paper-making machine, and, being of increased thickness, will of course tend to prolong the life of the fabric.

The two claims might as well be mentioned and they are as follows:

> 1. A fabric having warp and weft-threads, the warp-threads of which are passed, with respect to the top of the fabric, over one weft-thread and under two of the contiguous weft-threads, and so on uniformly throughout the fabric.
>
> 2. A fabric having warp and weft threads, the threads of one of said sets of threads being passed over one thread of the other set and under two of the contiguous threads of said other set, and so on uniformly throughout the fabric.

Kufferath therefore shows such a twill weave that " the top surface of the fabric presents a uniform surface to

the paper stock, and thus avoids marking the final product of the paper-making machine," which must mean that the tops of the warp and weft knuckles were to be substantially on a plane, and though that is not in terms mentioned, it is obvious that this was one of the objects of Kufferath's weave, because the uniform surface of the belt would tend to give a uniform surface to the paper. The specification also points out that in this twill weave the bottom of the fabric presents to the rolls and drums on which the fabric runs more of the warp-threads than of the weft-threads and also greater lengths of the warp-threads without the usual number of sharp bends in the warp, and that this makes the fabric more durable in that the action of the rolls on the fabric does not wear away the warp threads so quickly. It is conceded that Kufferath was a complete anticipation of the plaintiff's long crimp wire belt, and one of the points arising for decision is whether there is any inventive step in Lindsay's and Buell's "modified long crimp" wire belt, the subject-matter of the patent in suit, over the plaintiff's own long crimp wire, which it produced and sold more than two years before the application of Lindsay and Buell for the patent under discussion.

Sometime in 1929, after the economic depression had set in, the consumption of newsprint markedly decreased, and, it was stated, that purchasers of newsprint began to complain severely about wire markings on that class of paper. For example, it was stated, that the Hearst Press instructed the paper mills from whom they purchased newsprint that they should no longer use long crimp wire belts, if their patronage were longer desired. I was told that protests of this character were regarded as serious because in the newsprint business the market had become a buyer's market, whereas for some years prior to 1929 it was a producer's market and newsprint purchasers were obliged to accept the quality of newsprint which the mills offered for sale. This situation was calculated to affect the position of the manufacturers of wire belts which were sold to paper mills. To meet the complaints of newspaper publishers Mr. Buell testified that the plaintiff tried several expedients to overcome such complaints but without success. Then suddenly, he stated, the realization came to Lindsay and himself that, as the wire markings on the

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sheet of paper were due to the difference in elevation between the warp knuckles and the forming surface of the belt, the forming surface being the basis of support upon which the paper sheet was formed and which if irregular or uneven would cause wire markings to appear on the paper, the problem would be solved if this difference in elevation were corrected and the weft knuckle elevated to or near the plane of the warp knuckle. Elevating the weft knuckles, in the process of manufacturing a wire belt, it was conceded by Mr. Buell, involved no difficulty once it was decided to so manufacture a wire belt.

Now, that is what is claimed as invention by the plaintiff. It is that type of twill weave wire which is described in the patent under discussion and which the plaintiff manufactures, and to which it gave the name "modified long crimp," and which it is alleged the defendant is infringing. Soon, it is claimed, the modified long crimp wire belt became the standard Fourdrinier belt for paper mills, that would be between 1931 and 1934. Mr. Buell admitted that from the standpoint of wear, rigidity and ruggedness, there was no material distinction between the plaintiff's "long crimp" belt and the "modified long crimp" belt, in fact he stated that so far as resistance to damage was concerned the old long crimp wire was superior to the modified long crimp wire, and that was why it was still being used in kraft paper mills. In the modified long crimp wire belt, lighter weft wires are used, that is, the diameter is less than the warp wires, which obviously would tend to assist in the elevation of the weft knuckles, but the primary difference between the modified and the unmodified long crimp wire, Mr. Buell stated, was the high weft knuckles, which as the patent states reduces the depth of the wire marks and enables the smaller depressions to be more easily smoothed out on the presses of the paper machines. To raise the weft knuckles the patentees select certain wire sizes and certain weft counts, the warp wires are all spaced farther apart thus allowing more room for the weft knuckles and permitting the weft knuckles to be raised above their previous position. Whatever be the distinction between the plaintiff's long crimp wire and its modified long crimp wire the plaintiff claims it to be an invention, that it has been widely adopted, and that it affords subject-matter for a patent. Before proceed-

ing to pronounce any opinion upon the question of subject-matter in respect of the patent in question it will be convenient, I think, to look at the grounds put forward by the defendant in answer to the charge of infringement, and which will at the same time reveal the grounds of attack against the validity of the plaintiff's patent.

An important defence advanced against the charge of infringement is that the defendant's wire belt, the belt alleged to infringe, has been manufactured by it since more than two years prior to the date of the application of the plaintiff's patent, and that the same weave of wire belt was manufactured by another in Manchester, England, many years before that. Charles Johnson, the president of the defendant company, before coming to Canada in 1901, became associated in 1889, in some capacity, with his father's business, now C. H. Johnson & Sons Ld., of Manchester, England, which company, and its predecessors, have been manufacturing woven wire cloth since 1790, and had in 1804, as I understand the evidence, begun manufacturing plain weave wire cloth for use in Fourdrinier paper machines. This company's business had been conducted earlier in the form of partnerships, one of which was that of Johnson & Rowcliffe, the Johnson of the said partnership being the father of Charles Johnson. During all the tim ethat Charles Johnson was associated with his father's business it had been weaving twill wire cloth, though not solely, and in that weave it was the practice to use a soft weft wire for the purpose of having the weft wire rise to the surface of the finished cloth. In weaving, the warp wire normally exerts an upward pressure on the weft wire, and in the process of weaving there is what is called "beating," which exerts a force calculated to elevate the weft wire, and this practice the Manchester concern followed. The object in having the weft wire rise to the surface of the finished cloth, Charles Johnson stated, was to have the wet paper sheet bear evenly on, and be supported by, both the warp and weft knuckles right across the Fourdrinier wire, which would avoid depressions in the sheet, and marks from the knuckles, thus giving a smooth top surface to the paper formed on the belt. The weft wire used by the Manchester concern was always softer than the warp wire so that the weft wire might the more easily rise to the plane

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of the warp wire, but the warp and weft wires were usually of the same diameter. During the weaving of this twill wire cloth it was being constantly examined by a magnifying glass to see if the weft wire were being raised to the desired plane, and this examination, Charles Johnson stated, usually revealed that the weft wire did rise to, or nearly to, the face of the wire cloth. In the plaintiff's specification it is stated that the weft knuckles may be disposed somewhat higher or lower than the plane of the tops of the warp knuckles and still be within the spirit of the invention there claimed. The evidence of Mr. Johnson was confirmed by that of Mr. Fish who has been in the employ of the Manchester company since 1891, as a wire weaver.

When Charles Johnson entered his father's business in 1889, twill weave wire cloth had been woven for many years prior to that, and this particular weave was known as "Patent Twill," which was attributable to the fact that it was made according to the disclosure of a British patent issued to one Rowcliffe in 1869, Rowcliffe being one of the members of the partnership of Johnson & Rowcliffe, which I have earlier mentioned. I must refer to that patent briefly because, I think, it supports the evidence of Charles Johnson as to the manufacture of twill woven cloth in his time, in Manchester. The patentee points out as one part of his invention that the weft wire is to be much softer than the warp, "in order that the weft may more easily rise to the face of the wire cloth," and he explains his mechanism and its operation for producing such a woven wire product, and what he claimed as his invention was "improvements in the manufacture of wire cloth for paper making machines, the various improved modes of weaving the same so as to produce twilled, fancy, or basket patterns in the manner *and for the purposes described.*" Now one of the objects of Rowcliffe was to raise the weft wire to the face of the cloth, and it was for that reason that a soft weft wire was used, the purpose no doubt being to give a more uniform surface to the paper being formed. I think it may be accepted that at the time of the invention of Rowcliffe it was known by wire weavers that the warp knuckle normally protruded above the face of the cloth. We do know from the evidence of Charles Johnson and Fish that the method

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of weave disclosed by Rowcliffe was followed in the time of each in the mill at Manchester; they both testified that the twill woven wire was then manufactured so as to raise the weft wire to practically the same plane as the warp wire, so that the paper would bear evenly on the warp and weft knuckles of the wires, which, they stated, was then known to avoid wire markings on the paper. I think it is clear upon the evidence that the Manchester concern was aware for many years of the fact that an even surface on the woven wire cloth was desirable, and that this was calculated to give an even surface to the paper. At any rate the Manchester concern for many years manufactured twilled wire cloth for Fourdrinier paper machines, according to Rowcliffe, and in that manufacture the weft wire was raised and was known to raise to the face of the wire cloth. And that practice was followed by the defendant company in Canada.

In 1901 Charles Johnson came to Canada to engage in the manufacture of woven wire cloth, bringing with him looms and workmen, and he soon commenced manufacturing wire cloth, of a plain weave, in Montreal. In February, 1922, he concluded to manufacture a twill weave Fourdrinier wire, just as had been made in Manchester by his father's concern, and he had the Manchester company ship him the necessary equipment off one of its looms, to equip one of his own looms for the weaving of twill woven wire cloth. The equipment arrived in due course but was not set up until 1928. The first twill woven wire the defendant sold in Canada was in 1929, to the Dryden Paper Company, but this was manufactured by the Manchester concern. In March, 1929, the defendant sold a twill woven wire belt made on its own loom, with the Manchester equipment, and it has been manufacturing twill woven wire cloth since that date, and the defendant has used no other weaving equipment than that received from Manchester. It uses as soft a weft wire as is possible to use, and for the purpose of raising the weft wire to or near the plane of the warp wire so as to give an even surface to the wire cloth.

I am satisfied that the twill woven wire belts manufactured and sold by the defendant are produced on a loom fitted with the Manchester equipment, which is adapted to produce a twill woven wire belt substantially

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according to the Rowcliffe patent, and as manufactured by the Johnson concern at Manchester for many years prior to Lindsay and Buell. And the defendant company, I am satisfied, now manufactures twill woven wire belts in the same way. There is no reason for doubting the evidence of Charles Johnson, or his son, or Fish of Manchester, upon this point, and I unreservedly accept their evidence.

Now, is there invention in Lindsay and Buell? I think not. It must have been always obvious to all engaged in the manufacture of wire belts for Fourdrinier paper machines that it was desirable that the upper surface of the wire belt should be as uniform as possible, particularly when used in the production of newsprint or fine paper. The conception of weaving a twill wire cloth so that the top of the weft knuckles should lie substantially in the plane of the top of the warp knuckles was not an original one with Hamilton and Buell, and could hardly constitute invention in 1931, the date of their application. Rowcliffe had that in mind as one of the objects of his invention back in 1869, and for that purpose and none other he suggested the use of a weft wire that was softer than the warp wire, and the Johnson concern of Manchester apparently followed that form of twill weave with a soft weft wire, for half a century. That was what Kufferath impliedly disclosed in 1899, and Mr. Buell in terms admitted that Kufferath and the plaintiff's long crimp wire were one and the same thing, so that the plaintiff's long crimp wire must have given a relatively uniform top surface, by having the warp and weft wires lying substantially in a common plane. Mr. Buell stated that the fundamental difference between the plaintiff's long crimp wire and its modified long crimp wire was in the "high weft knuckles," and, I assume, by that it was meant that in the latter the weft knuckles were higher than in the plain weave, or higher than in the plaintiff's long crimp wire; it would not be correct to say that in Lindsay and Buell the weft knuckles were higher than the warp knuckles, because the patent itself states that the knuckles of the warp and weft wires are to be on the same plane, and it also states that the knuckles of the weft wires may be on a lower plane than the knuckles of the warp wire, and still be within the spirit

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of the invention. The conception of Lindsay and Buell was that the weft wire should be high enough to give such adequate support to the pulp that would avoid depressions in the web of paper, and also avoid wire markings, but that was not an original conception. Strength, durability and flexibility, adequate drainage, and an even surface, are no doubt desirable characteristics in a Fourdrinier wire belt, but surely that is open to anybody to attain and to practise, if desired. To vary the size, count or spacing of wires, the precise height of the weft knuckles in relation to the warp knuckles, or the formation of the mesh, cannot, I think, constitute invention, when once it is known how to weave a twill wire belt that generally meets the requirements for which it was made. Small variations from, or slight modifications of, the current standards of construction, in an old art, rarely are indicative of invention; they are usually obvious improvements resulting from experience, and the changing requirements of users. If the complaints of newspaper publishers, after 1929, in respect of wire markings are to be accepted—and probably they were very much exaggerated —the solution of that problem was already known, that is, by weaving the top knuckles of the warp and weft wires substantially in a common plane, just as the defendant had been doing, and whose wire belt is now said to infringe Lindsay & Buell. Even if in Lindsay and Buell's modified long crimp wire the warp and weft knuckles were nearer on a common plane than they were in the plaintiff's long crimp wire that surely cannot constitute invention, when it was known that the nearer the warp and weft knuckles were on the same plane the more even would be the surface of the wire, and the paper, and it is admitted that it was well known how to weave such a wire, if one determined upon doing so. If Lindsay and Buell discloses some modification of the plaintiff's long crimp wire, or the Manchester wire, it is but a slight modification and not invention. It should be open to all those who manufacture wire cloth or belts to make such minor improvements and modifications in their product as experience suggests from time to time, and as their customers' requirements demand.

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I think therefore the plaintiff's action in respect of this patent must fail (1) because there is no invention in anything disclosed in the patent, (2) because it discloses no inventive step over the plaintiff's long crimp wire, and (3) because the defendant was making the wire belt which it is now said to infringe since 1929, more than two years before the application was made for the patent in question. In any event the defendant is protected by s. 50 of the Patent Act of 1927. There can be no infringement on the part of the defendant in making the same weave of wire belt which it began to make in 1929, and which form of weave had been followed by the Johnson Company of Manchester for a long number of years.

I now turn to the other two patents, numbered 234,657 and 259,463 respectively, both of which relate to methods of joining the ends of a woven wire belt, having a special weave, to form an endless belt, particularly for use in Fourdrinier paper machines. Those two patents are referred to as seam patents, the seam being formed where the two ends of the wire belt are joined, and which operation is performed manually.

The essential features of a seam are that it be strong, that the wire threads employed in seaming, called stitching and closing threads, be so laced into the wire belt so as not to pull out the last weft thread which under tension is readily displaced, that it does not cause any unevenness in the belt surface or wire markings on the paper, and that the holes through which the stitching and closing wires are passed, are so chosen as not to interfere unduly with the water drainage from the wet pulp as it is carried over the belt.

Patent No. 234,657 suggests first the use of stitching wires between every third warp wire and over the fourth weft wire from each end, with one closing wire through loops formed by the stitching wires, as shown in figs. 1 to 4 inclusive, and secondly, the same stitching wire as shown in figs. 1 to 4 with two closing wires, one through the loops and one through and over the second weft wire. One of the objects of the stitching wires is to fashion or anchor the last weft wires in the ends of the belts, the stitching wires being in loop form, through which the closing wire is passed, and which finally unite the ends of the belt.

Claims 1, 2 and 3 of this patent are said to be infringed by the defendant and claim 3 might be mentioned:

A seam for an endless belt wherein the weave comprises warp wires and lay wires, the warp wires having long knuckles on one side of the belt and short knuckles on the other side thereof, having a seam wire extending over a lay wire and intermediate two warp wires, one of the warp wires having a short knuckle over said lay wire and the other of said warp wires having a short knuckle over the adjacent lay wire.

Patent No. 259,463 is a reissue of patent No. 234,658, the drawings being the same as those in the original patent, but one new paragraph is added in the specification, and claims 13, 14, 15 and 16 have been added, which are the claims alleged to be infringed by the defendant. In this patent, as shown by figs. 1 to 4, there are two stitching wires, one between every group of three warp wires and over the third weft wire, and around the end weft wire, the other between another group of three warp wires, over the second weft wire and around the end weft wire; then, as shown by figs. 5 and 6, there is a closing wire going through every loop made by the stitching wires, just as I have already explained. The claims sued on however, do refer to one single wire for closing with means for holding the end weft wires in position.

These two patents may be discussed together. It is obvious that the ends of a woven wire belt, in order to form an endless belt, have to be joined together in some way, and that the seam should so far as possible possess the requirements which I have already mentioned. It was obvious that the seaming would not be effective if the stitching and closing wires were merely tied to the end weft wires of the belt because, under any tension, they would be pulled out of the weave. Therefore the stitching threads would have to be positioned at some other points farther back in the weave than the last weft wires, but near to the ends of the belt, and in this way anchor the last weft wires into the weave, and this was for a long time the general practice. The seaming, by stitching and closing wires, was always more or less troublesome and now that practice has been abandoned and the ends of the warp wires are now welded together. The principle disclosed in the plaintiff's seam patents for joining the ends of a woven wire cloth was long in practice, with variations

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from time to time, as experience, and trial and error, would suggest or dictate. Wire belt manufacturers were constantly seeking improved methods in seaming, and in practically the same way. Mr. Buell, of the plaintiff company, stated that it was by numerous experiments, and by trial and error, old methods were gradually improved, and he told of how his company went from the stitching seam to the partly stitched or soldered seam, in which the last weft wire was soldered to the warp wire to get rid of some of the stitching wires at the warp ends. Mr. Buell stated that the holes chosen for the seaming would differ with the kind of weave in the wire cloth. Now, the method of stitching together the ends of a wire belt employed by the Johnson Company of Manchester, for many years prior to Lindsay, was in principle the same as that described in the plaintiff's patents. I do not mean to say they used precisely the same holes in the wire cloth, for stitching purposes, as those patents suggest, but, in my opinion, there is no patentable distinction between them.

The art of joining the two ends of a woven wire cloth by wire stitching was quite old. I think it is hardly arguable that there is subject-matter in the plaintiff's seam patents. No step is disclosed there which could be described as invention. There is not, in my opinion, that distinction between what was known before, and that disclosed by Lindsay, that called for that degree of ingenuity requisite to support a patent. If those patents could be supported it would seriously impede all improvements in the practical application of common knowledge. I therefore find that the plaintiff's seaming patents lack subject-matter, and consequently there can be no infringement. Having found that the two seam patents lack subject-matter, and that there is no infringement, it is unnecessary to discuss the matter of the validity of the reissued patent.

The plaintiff's action is therefore dismissed and with costs.

Judgment accordingly.