BETWEEN:—

J. O. ROSS ENGINEERING CORPORATION AND C.L.W. PATENTS CORPORATION ..... } PLAINTIFFS;

AND

CANADA PAPER COMPANY AND HOWARD SMITH PAPER MILLS LIMITED ..... } DEFENDANTS.

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Jan. 7, 8. 11 to 15. May 27.

Patents—Infringement—Specification

The patent in suit granted to Wagner, and assigned to plaintiffs, is for a method and apparatus for the recovery of chemicals and of heat from the waste liquors used in the chemical pulp industry. The plaintiffs' apparatus is a self-sustaining process, a unitary structure capable of complete recovery of the active reagents from the waste liquors, stress being laid upon the fact that the upper chamber must be kept at a high temperature, and that the liquor must be sprayed in so that destructive distillation takes place in the upper zone. The defendants' alleged infringing apparatus is for the same purpose but in the defendants' case the liquor is projected into the furnace without atomizing and onto the walls of the furnace where it adheres and from which, after a certain quantity of the water has been removed, it drops to the hearth of the furnace, in lumps of varying sizes, where it burns by the action of the organic matter contents not consumed

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in the upper zone or intended to be so consumed. A boiler is placed at the top to prevent the upper zone becoming overheated and thus minimize the possibility of combustion of the materials in that zone.

Held, that the essence of the alleged invention rested on what the patentee describes as a process of destructive distillation of waste liquors, the evaporation of all water and combustion of nearly all the consumable products in the liquor, i.e., woody or ligneous matter, in its downward flight in the upper zone of the furnace, leaving nothing but a carbon residue and non-volatile salts reaching the floor of the furnace, and that the method employed by the defendants where recovery takes place on the hearth and not by distillation in the upper zone, was not Wagner and was not inferable from Wagner, but was radically different, was based on an altogether different idea and principle and could not be said to be an infringement of plaintiffs' patent.

ACTION by plaintiffs to have their patent for a certain method and apparatus for the recovery of chemicals in waste liquors declared valid and infringed by the defendants.

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 plaintiffs.

Warren Chipman, K.C., and *H. Gerin-Lajoie, K.C.,* for defendants.

The facts of the case and parts of the Specification and patent material to the issue are stated in the Reasons for Judgment.

THE PRESIDENT, now (May 27, 1932), delivered the following judgment.

This is an action for the infringement of a patent granted to one Wagner in January, 1927, upon an application filed in January, 1925, and is alleged to relate to new and useful improvements in the Method and Apparatus for the Recovery of chemicals and heat from waste liquors resulting from the processes in industry.

It is claimed that the alleged invention finds ready adaptation in the process of waste liquor recovery in the chemical paper pulp industry. The main constituents of the digestant liquors in this industry are soda and sulphur, which reagents are used either separately or in combination to form the wood digestive liquors of the "soda," "sulphate" and "mono-sulphite" processes. In these sev-

eral processes the quantity of chemicals employed to digest the chipped wood, which is placed in a digester, is very considerable and the cost of the same per ton of pulp is quite substantial. After the wood is digested a black liquor remains, containing the chemicals employed and all the intercellular substances or ligneous matter dissolved from the wood, except any portion which was wasted during the completion of the process. Various methods have been employed in the past to recover the chemicals from this liquor so that the same might be used over again. In comparatively recent years a rotary furnace came into use, replacing, I think, a flat horizontal incinerator which had been previously used for the recovery of chemicals. The rotary furnace was apparently in use for many years but it is not necessary to describe the construction or operation of this type of furnace, and, I think, it may be conceded that for several reasons it was not as satisfactory as the stationary furnaces which later came into use, and which in general construction are of the same type as the Wagner furnace, and the alleged infringing furnace used by the defendant, Canada Paper Company.

The defendants plead the usual defences in infringement actions. It is always most important to ascertain from the specification what is the exact invention protected, and that point was much in controversy during the progress of the trial. It will be necessary therefore to refer at length to the specification.

The patentee states in his specification that in the chemical paper pulp industry the matter of the recovery of chemicals from the waste liquor had theretofore presented a difficult problem. He refers to the so called rotary process and he enumerates the difficulties of and objections to this method of recovery. The patentee then proceeds to state that among the objects of his alleged invention it was contemplated to provide a self-sustaining process and apparatus for recovering chemical waste liquors; to provide a unitary structure capable of complete recovery of the active reagents from the waste liquors in a one step continuous operation; to eliminate the use of a continuously operable heating medium for carrying out the combustion of the waste liquor; and to collaterally produce heat from the volatile constituents of the waste liquors,

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which might be used in outside heating units, such as steam boilers. The specification then proceeds to state:—

Broadly, my invention contemplates the destructive distillation of the waste liquors and the combustion of the consumable products of such distillation, the remaining solid residue or non-volatile salts being discharged as recovered reagents substantially free from carbonaceous matter. It has heretofore been proposed as in the United States patent to Atwood No. 418,265 to purify such wastes by discharging them under a boiler for consumption. Such processes, however, have not proven successful. The waste liquor itself is not in an inflammable condition and it is rendered inflammable only after being subjected to sufficient heat to effect its destructive distillation, and in the Atwood patent there was no adequate provision for maintaining the temperature at the point of admission of the liquors high enough to cause the destructive distillation satisfactorily. Also, by reason of the fact that the reagents were carried onwardly through the furnace, the heat generated by such consumption of the distilled products as would occur was not available for use at the point where the distillation was required. The subsequent combustion of the products of distillation, was incomplete and unsatisfactory by reason of the fact that insufficient air was provided to effect it. With the aforesaid proposed process, moreover, the heat absorbed by the presence of the boiler in the chamber where the reactions are intended to occur was so great that the necessary temperature could not be maintained and, moreover, the particles were sprayed into the chamber so close to the bottom that unaltered particles of liquor fell on to the bottom, resulting in a loss of heat from the process and a contamination of the reagents as they issued from the chamber. The process, therefore, was never operative.

It was thereafter proposed to maintain the temperature of the chamber artificially as in the United States patent to Moore No. 1,137,780. In this process the liquor is sprayed horizontally into a chamber, the temperature of which is maintained by the consumption of additional fuel at the point where destructive distillation should occur. For this purpose crude oil was used. The gases were thereupon carried outwardly in the expectation that they would be consumed. This process is unsatisfactory, not only because of the cost of the additional fuel which must be supplied to distil the liquor, but also by reason of the fact that the gases resulting from the destructive distillation are not consumed, due to an insufficient air supply, but are carried outwardly of the apparatus, the resultant heat being lost to the process. With this process the liquor is sprayed into the furnace in practice about six feet above the level of the floor of the furnace. The liquor, however, is of comparatively viscous nature and, when sprayed within so short a distance of the floor, much of it falls upon the floor of the chamber unaltered. It has been proposed to permit the addition of air to play upon the mass thus appearing upon the floor in the hope that its complete consumption could thereby be effected.

In accordance with present invention, it has been discovered that if the heat resulting from the consumption of the distilled products is returned to heat the distillation chamber, that no additional fuel is required. It has been further found that while the distillation products can be completely consumed if air be admitted after the distillation is commenced, that no amount of air admitted prior to distillation produces a satisfactory combustion, without such subsequent addition.

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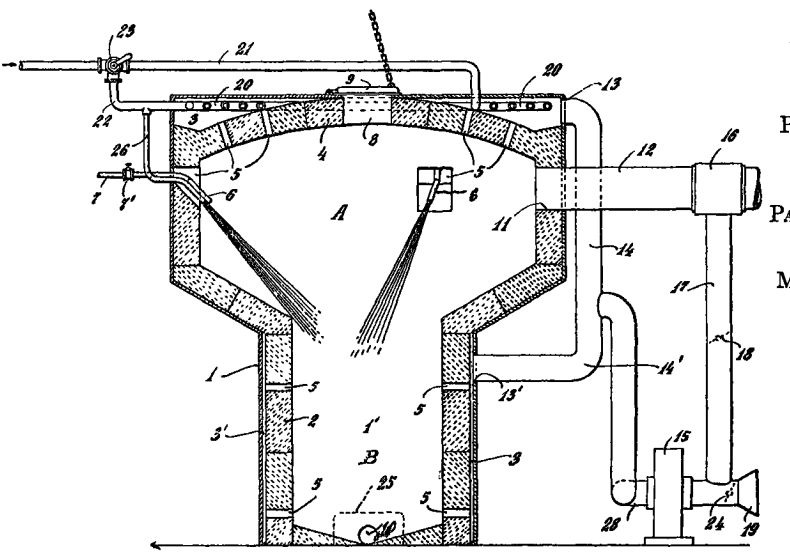
Fig. 1 is a longitudinal cross-sectional view of one of the several types of furnaces illustrating, it is said, "the principle of my invention," and it is reproduced below.



The Wagner furnace, which is vertical, is a chamber of metal substantially air tight, with a refractory lining constructed close to and along the entire interior walls, with the exception of Section 3 along the top of the chamber and annular section 3' along the lower or base portion of the chamber, wherein air spaces are provided to serve as pre-heating areas for air entering under pressure. Within section 3 is provided a coil 20, in which air to be used in the atomizing of the fuel and the waste liquor, is pre-heated, and this coil is connected to a main air feed conduit 21, and an auxiliary feed conduit 22, control of the flow of air being obtained by means of a 3-way valve 23. A conduit 26, leading from the coil 20 discharges the air, which is pre-heated in chamber 3, into nozzles 6, which are inclined downwardly. Throughout the refractory lining 2, adjacent pre-heated sections 3 and 3^1, there are openings which serve for the accommodation of the waste liquor nozzles, or as passageways through which air being discharged from the pre-heated area may be distributed into the upper furnace chamber zone A, or the lower chamber zone B. The specification suggests the pre-heating of the waste liquor in the pre-heating area 3 and using air under

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pressure to atomize the pre-heated waste liquor entering into the nozzles. After some further description of the air feed system, the patentee states that the waste hot gases produced in the furnace chamber are discharged through a conduit to a boiler, not shown in the drawings. The specification then proceeds to state:—

With the above construction, it has been found that the difficulty resulting from the falling of unaltered particles upon the floor of the chamber may be completely obviated by increasing the height of the chamber to permit a greater time for the reaction between the heated gases and the particles.

* * * * *

As will be observed from the drawing the furnace proper is divided into two zones "A" and "B", in which the processes of destructive distillation of the waste liquor may be taking place simultaneously in two consecutive steps. It should be understood however that this invention is not limited to a two step process taking place in two zones in a single furnace, it being within the contemplation of the inventor to carry out the operations in one step if desired.

The operation is started by forcing oil and air through nozzles 6, whereby the atomized oil is burned until the temperature within the upper zone "A" of the furnace is between 1,200° F. and 2,500° F. at which time the oil supply is shut off at 7', and the waste liquor supply tank connected with nozzles 6 through the conduit 7. The waste liquor on passing through the nozzle, together with the pre-heated air fed through the coil 20 becomes atomized as it emerges into the zone "A", and the volatile gases distil on account of high temperature previously produced by the oil. This combustion in zone "A" of the chamber is carried on in an atmosphere of pre-heated air distributed from the heating area 3, through the openings 5 and into the combustion chamber. The combustion, or destructive distillation in zone "A" results in the liberation of the volatile constituents in the waste liquor, leaving only non-volatile salts and carbon which drop toward zone "B." The volatile constituents evaporated from the atomized waste liquor, when burned, are drawn through the opening 11 into the conduit 12 leading to the boiler or stack.

As the non-volatile salts and carbon pass by gravity into zone "B" of the furnace chamber, the pre-heated dry air being then discharged from the heating annular area 3', passes through the openings 5 and contacts therewith. This pre-heated air produced an incineration or combustion, of the residue dropping from zone "A," by which combustion the carbon is oxidized, and the resulting volatilized gases drawn into the conduit 12 leading to the boiler stack. The residual salts of course become fused and flow toward the tap hole 10, where they are removed intermittently or continuously as desired, by gravity or mechanically. To produce a positive flow of the fused salts through the tap hole, the pre-heated air being discharged into the combustion zone "B" is usually forced through the openings 5 under pressure.

As has been stated, the products of distillation pass through the conduit 12 into the boiler stack. These gaseous products serve as heating means for producing steam under the boiler (not shown). Consequently after the initial pre-heating of the chamber into which the waste liquor is to be destructively distilled, there is a continuous production of heat

in the form of distilled volatile gases which pass to an exterior unit, and serve as heat producing means in that unit. In general the process contemplates the reproduction or recovery of the original available constituents of the waste liquor, plus the utilization of the excess heat value of the combustible material originally in solution with the recovered constituents and separated therefrom by destructive distillation.

* * * * *

From the foregoing it will be evident that it is possible to so adjust the spray and the air supply to the size of the furnace and to the temperature maintained that the destructive distillation will be completed before the particles reach the floor of the furnace, but it is not usually desirable that the carbon content shall be completely consumed during transit. It has been found that usually the maximum recovery of reagents occurs when the inorganic salts fall to the bottom with the carbon residue so that the final reduction of the salts occur during the consumption of the residual carbon on the floor of the furnace. With this operation there is less tendency for the inorganic salts to be lost in the flue gases. With this operation there falls to the bottom of the vessel a flaky carbonaceous mass from which the carbon is gradually consumed by the entering air, and as the carbon is consumed the inorganic matter becomes fused upon the bottom.

It seems to me that the true construction of the specification is, that the essence of the alleged invention rests in what the patentee describes as a process of destructive distillation of waste liquors, the evaporation of all the water and the combustion of nearly all of the consumable products in the liquor, that is all woody or ligneous matter, in its downward flight through the upper furnace zone principally, leaving nothing but a carbon residue and non-volatile salts reaching the floor of the furnace. There is of course the return of heat resulting from the combustion of the distilled products to heat the distillation chamber so that no additional fuel is required, but that I think, is only of secondary importance and was not of itself new. The actual form of the furnace construction is not, I think, of the essence of the alleged invention. I cannot believe that anything else was in the mind of the patentee, but what he states, namely, that his invention contemplated the "destructive distillation of the waste liquors and the combustion of the consumable products of such distillation the remaining solid residue or non-volatile salts being discharged as recovered reagents substantially free from carbonaceous matter." He very definitely states that a very high temperature is required in the upper zone where the waste liquor is introduced; he states that the combustion in zone A is carried on in an atmosphere of pre-heated

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air, and every provision is made to secure this high temperature initially and to maintain it; he seems to require this temperature in that portion of the furnace where he expects certain reactions to take place. He is critical of Atwood for not making adequate provision for maintaining a sufficiently high temperature, at the point of admission of the waste liquors into the furnace, to cause destructive distillation satisfactorily. He is also critical of Atwood because of the presence of a boiler at the top of the furnace where the reactions are intended to occur, for the reason that " the heat absorbed by the presence of the boiler in the chamber where the reactions are intended to occur, was so great that the necessary temperature could not be maintained," that is to say, the presence of the boiler had the effect of lowering the temperature, by the absorption of heat in the upper portion of the furnace, where Wagner expected destructive distillation to occur. Moreover, the patentee states that in Atwood the particles were sprayed so close to the bottom of the furnace that " unaltered particles of liquor fell on to the bottom, resulting in a loss of heat from the process and a contamination of the reagents as they issued from the chamber." The patentee also states that if the heat resulting from the consumption of the distilled products is returned to heat the distillation chamber that no additional fuel is required and he states that if air be admitted after distillation is commenced, that the distilled products will be completely consumed, and that no amount of air admitted prior to distillation effects satisfactory results. All this shows very clearly, I think, that it was the avowed intention of the patentee to build up a high temperature in zone A of the chamber, as high as 2,500° F., while in zone B the temperature was to be considerably lower. This is further made manifest by the specification which states " the combustion or destructive distillation in zone A results in the liberation of the volatile constituents in the waste liquor, leaving only non-volatile salts and carbon which drop towards zone B." This can only be interpreted as meaning that all, or nearly all, the ligneous or combustible matter in the liquor sprayed into the furnace, not on the walls, was to be burned in zone A, and that the residue of carbon and non-volatile salts went to the floor of the furnace, where the final reduction of the

salts took place. And the patentee makes this rather clear by stating that what falls to the bottom of the furnace is a flaky carbonaceous mass from which the carbon is gradually consumed by reason of the entering air, and as the carbon is consumed the inorganic matter becomes fused upon the bottom of the furnace. Then the specification also states that if, with the furnace construction described, unaltered particles fall upon the floor of the chamber, this may be completely obviated by increasing the height of the chamber to permit a greater time for the reaction between the heated gases and the particles; this must have been intended to mean that given a longer flight for the sprayed liquor, the falling of unaltered particles upon the furnace floor would cease, and nothing but residual carbon and non-volatile salts would reach the furnace floor. All this, I think, makes it clear that the true construction of the specification is what I have already stated it to be.

Now, turning to the furnace installed at Windsor Mills by Canada Paper Company, one of the defendants, and the method there employed for recovering chemicals from waste liquor; and this is the alleged infringing furnace. At Windsor Mills the waste liquor is sprayed, it is claimed, downwards through two nozzles against the walls of the furnace, which, is of the standard type of furnace construction. No air is used in forming the spray, that is to say, the spray is not atomized, which if done, would likely cause fine particles of matter to be found in the spray. The only purpose, it is claimed, in spraying the waste liquor into the furnace is to evaporate the water out of it in its flight to the walls, and forty to fifty per cent of the waste liquor is made up of water. The defendants do not seek to completely evaporate the water out of the liquor, but arrange it so that somewhere from five to ten per cent still remains when it reaches the furnace walls as an insurance against combustion, which they seek to avoid at this stage in their process of chemical recovery. The liquor sprayed on the walls forms a spongy crust, comprising the original constituents of the liquor less the water evaporated, and it is claimed that it intermittently drops from the walls in dried lumps of varying sizes to the floor of the furnace where it burns by the action of the organic matter content which was not consumed, or intended to be consumed, while

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on the walls of the furnace nor while being sprayed there. In the Windsor Mills installation a boiler is placed directly at the top of the furnace to absorb heat, which would of course reduce the temperature in the upper portion of the furnace, and thus minimize the possibility of combustion of the consumable materials in the liquor in that section of the furnace. The defendants contend that in this respect they do the very thing which Wagner condemns in Atwood, although, as I understand it, in some installations made by Ross Engineering Corporation under the Wagner patent, a boiler or boiler tubes is to be found at the top of the furnace. Exhibit 5, illustrative of Wagner's invention, and put in evidence by the plaintiffs, shows boiler tubes under the ceiling of the furnace. When the recovery furnace installed by the Ross Engineering Corporation at Cornwall, Ont., according to the Wagner patent, was proving unsatisfactory and particularly destructive to the roof of the furnace, it was stated in evidence, and I believe the evidence of Tomlinson in that regard, that Wagner himself upon consultation opposed the suggested remedial measure of installing a boiler or boiler tubes at the top of the furnace and thus prevent destruction of the roof; this suggestion naturally would be in conflict with Wagner's theory of destructive distillation in the upper zone of his furnace. It was the deliberate and matured plan of the management of the Windsor Mills, it is claimed, that in their recovery process combustion of the woody or ligneous matter in the waste liquor should be avoided in the upper section of the furnace, and that it should take place on the floor of the furnace where it would function as fuel for the smelting or fusing of the chemicals, whereas the patentee intends that consumption of the products of destructive distillation should almost wholly take place in the downward flight of the liquor through the furnace, reduction taking place on the furnace floor by the burning of the carbon residue and the inorganic salts. The defendants also assert that they provide for the introduction of much more air coming in through the lower portion of the furnace, through ports, than through the upper portion, because, it is claimed, the oxygen of the air is required there to aid or accelerate combustion of the material which has fallen in lumps, and not in small particles, whereas at the top of the

furnace it is only evaporation of the greater portion of the water that is required and consequently a lower temperature is sufficient. It is also claimed that all or most of the combustible material passes to the bottom of the furnace in the Windsor Mills installation, because it is in lumps and not in fine particles as in the Wagner process where all the material does not reach the furnace floor but passes out elsewhere with the distilled gases, because it is in fine particles. There is a conflict between the parties as to the direction of the flow of the air in the lower section of the defendants' furnace, whether downwards or upwards, but, I think, from the evidence, it must be held that the air is directed and carried downwards upon the burning mass on the floor of the furnace by velocity and by gravity, as, I think, it was intended. The plaintiffs deny what the defendants allege as occurring in the Windsor Mills furnace and contend that the process of recovery there employed is one of destructive distillation the same as in Wagner.

Two of the plaintiffs' witnesses, Mr. Webster and Mr. Hunicke, examined the furnace at Windsor Mills, for a short time in July, 1930, by arrangement, and these witnesses testified that they could not see any waste liquor being sprayed against the walls of the furnace, but that it dropped through the upper and lower zones of the furnace and was consumed in its downward flight. This evidence is rather negative in its character. Any changes that were subsequently made in the wall construction of this furnace did not affect the operation of the furnace, Mr. Webster stated. Evidence of temperatures taken inside this furnace was given by Mr. Hazen, an expert witness for the defence, corroborated by Dr. Hibbert present at the same time, and the temperatures observed were 1,800° F. and 1,860° F. at the floor of the furnace, while at the top of the spray the temperatures observed were 1,500° F. and 1,510° F. So that in the case of the infringing furnace the higher temperature was at the bottom of the furnace and the lower at the top of the furnace, the reverse of that obtaining in Wagner. Then the witness Hazen, corroborated by the witness Hibbert, took from the floor of the Windsor Mills furnace samples of the material there found and upon analysis found that it comprised 42·7 per cent of unconsumed woody or ligneous matter, a very high pro-

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portion of the original organic matter in the liquor and which Wagner states should be consumed in zone A of his furnace, and these two witnesses also testified that they saw the sprayed matter dropping from the walls in lumps of varying sizes. The witness Hibbert stated that if the ligneous material was consumed in zone A, one would see only burning particles or drops falling, and not lumps. There is no reason why I should disbelieve this evidence. I am of the opinion that the ligneous material in the liquor was not consumed when being sprayed on the wall, or before it dropped off the wall, and that the combustion of this material occurred on the furnace floor where it served as a fuel for the smelting of the chemicals, and consequently it could not have been destructively distilled in the upper section of the furnace. And Mr. Tomlinson, the manager of the Windsor Mills plant, stated as a fact, what I think I have already mentioned, that what he intended to take place was that the ligneous material should be used for fusing purposes on the furnace floor and not consumed elsewhere, and apparently he had become convinced by reason of his experience with the Wagner installation at Cornwall that the Wagner chemical recovery furnace and the method of operation was fundamentally in error and unsound. But there is further and, I think, very cogent evidence as to the possibility of operating a chemical recovery furnace upon the alleged method or principle of operation of the Windsor Mills furnace. I think this evidence indubitably shows that the Windsor Mills chemical recovery furnace might be operated in the manner which three of the defendants' witnesses say it is operated. Since 1917 there has been in operation at La Tuque, P.Q., a stationary chemical recovery furnace under the direction or superintendence of Mr. Bjornlund, who gave evidence under subpoena. I feel I can thoroughly rely upon the testimony of this witness as being disinterested and reliable. The La Tuque Chemical recovery furnace is owned and operated by The Brown Corporation; the plant is not open to visitations by the public and consequently the principle of recovery there employed was unknown to the parties to this action, until a short time prior to the trial. The construction of that furnace is practically the same as that at Windsor Mills, but of course one would expect to find in almost any such

furnace structural variations. Bjornlund, quite unconcerned about the controversy between the parties here, or their respective methods or furnaces employed for the recovery of chemicals from waste liquors, testified that since 1917, in the La Tuque furnace, the waste liquor, which is pre-heated, is sprayed on the ceiling of the furnace, or the walls; that there is a boiler placed at the top of the furnace to carry away the heat from the furnace gases and to produce steam; that the sprayed liquor reached the walls where the particles gathered together without the ligneous material being consumed; and he testified that he thus got a mass of material clinging on the furnace walls, and as the water evaporated, pieces the size of one's head and smaller, fell to the furnace floor and acted as a fuel in the combustion and fluxing of the non-volatile salts. To me this is conclusive of the practicability of the defendants' method of chemical recovery. The La Tuque installation was made by one Moore, the Moore referred to in the patentee's specification, and it was charged against the defendants that they did not put in evidence the Moore patent, and certain scientific papers published by Moore. The obvious answer to that is that Moore was not obliged to follow the teaching of his patent or the preaching of his learned scientific papers. The La Tuque installation is what it is, and the Moore patent and scientific papers are irrelevant as to what in point of fact is the nature of the La Tuque installation. Another witness, Mr. Freeman, and I should have earlier stated this, testified that upon examination of the defendants' furnace in operation, he observed masses of sprayed material on the furnace wall and that he also observed large pieces falling off and dropping to the furnace floor; he also testified that cold air entering the lower part of the defendants' furnace, being seven times heavier than the inner air, would descend by force of gravity and momentum and mix with the burning material on the furnace floor and later would ascend into the upper portion of the furnace; this cold air, it will be remembered, as claimed by the defendants, is introduced to aid combustion of the material on the floor of the furnace. While the plaintiffs pressed the view that this air when introduced into the furnace ascended to the upper section of the furnace, yet I think I must accept the evi-

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dence for the defence upon the point. I am of the opinion that the Windsor Mills chemical recovery furnace is operated in the manner described by the defendants' witnesses. The fact that the Windsor Mills furnace is higher than the La Tuque furnace does not imply that it is operated after the method of Wagner.

The method of chemical recovery employed by the defendants is quite different to that of Wagner; the particular furnace construction for carrying out either method is not, I think, a serious element in the controversy. The method employed by the defendants for the recovery of chemicals is not Wagner, it is not inferable from Wagner, and it is based on a different idea and principle altogether. It is quite improbable that Wagner, in view of his specification, could have had in mind the principle underlying the method employed in the defendants' furnace, and which is quite unlike that described in the patent in suit. The distinction between the two is, I think, quite manifest. The Windsor Mills furnace embodies the same method of chemical recovery and the same furnace construction as the furnace at La Tuque, but La Tuque was in operation in its present form since 1917, and preceded Wagner by many years. The La Tuque installation could not possibly infringe Wagner, and it follows of course, that the Windsor Mills furnace could not infringe either.

The defendants contended that Wagner as described in the patent in suit was inoperable and therefore invalid, and that Wagner as exemplified by Exhibit 5 in the evidence was not truly illustrative of Wagner as described in the patent, but in view of the conclusion already expressed it is not necessary that I deal with these points.

For the reasons which I have stated the plaintiffs must, in my opinion, fail in their action for infringement with the usual consequences as to costs.

Judgment accordingly.