Case No. 17,396.

WELLS v. HAGAMAN.

[29 Leg. Int. 405.][1]

Circuit Court, E. D. Pennsylvania. Dec. 20, 1872.

PATENTS—INFRINGEMENT—NOVELTY AND INVENTION—PRACTICE—REFERENCE TO COMMISSION OF EXPERTS.

1. In the machine for making hat bodies, the fibres of disintegrated fur which compose the bat are deposited upon the surface of a revolving perforated cone, beneath which a fan partially exhausts the air. This exhaustion causes an atmospheric pressure, which, above and around the cone, forces the fibres towards it, and retains them upon it. The fur is previously disintegrated by a revolving picker. A defect of the machine was that the currents of air produced by the rotation of the picker, not being conducted or directed, in proper planes, towards the cone, were divergent, and scattered the fibres. This former defect was first remedied by interposing an air chamber, to conduct the stream of fibres from the front of the picker, in the proper planes, towards the cone, with auxiliary and incidental appliances.

2. A patent for such an air chamber and appendages was not infringed by the substitution of a short uncovered fur projector in front of the picker. The revolution of the picker, if downward, produced a current of air whose primary direction was forward and downward. This direction of the air downward was gradually changed on the surface of the fur projector, which was formed or composed of a plate, or system of adjacent plates, of such a graduated inclination upward, and such a compound curvature, as coincided with a theory that the aerial current should project the fibres beyond

the plate or plates, through open air, for the distances and in the planes required.

3. What would otherwise have been such a fur projector may be so elongated towards the cone, and may be of such curvature and elevation, as to become, in effect, a conducting trough, upon whose bottom the pressure of the air, from the resistance of its continuing downward tendency, may be so retained that a cover and elevated sides can be dispensed with. The patent was infringed by the use of such a trough, which the fibres did not leave until they arrived where the dominant aerial force towards the cone was no longer that which had originated in the rotation of the picker, but became that of atmospheric pressure caused by the exhaustion below the cone.

4. In a case doubtful in this respect, the question, which force predominated where the fibres left the supporting surface, might be a proper subject of reference to a commission of experts, or to a master.

5. The bat, when formed upon the metallic perforated cone, is covered with a felted or fulled cloth, wet with hot water, over which is drawn another perforated metallic cone, with or without an additional inner one, when the whole are immersed in hot water, whereby the bat is hardened sufficiently to be removed from the cone. The novelty of such a use of the wet, hot, covering cloth was denied where a printed description of a like use of a cowl of linen or flannel to be drawn gently over the bat, had been previously published. It was objected to the prior description, that a "cowl," properly so called, could not be thus used without a destructive abrasion of the newly formed bat. To this objection, it was a sufficient answer, that if such abrasion would have occurred from such use of a cover sewed up in the form of a cowl, a person skilled in the art would have understood the intended or proper use to be that of an open cloth, gently folded in the form of a cowl, upon the bat.

6. It was further objected that the prior description—though it stated that the original perforated cone, the bat, and its flannel or linen cowl, were to be covered with the other perforated metallic cone, and the whole then at once immersed in the boiling water—omitted to state that the linen or flannel cowl, when first applied, was to be wet with hot water, or wet at all. To this objection it was answered—First, that until the immersion of the whole, either a dry cloth or a wet one could be used, and that the difference was unimportant; secondly, that if it was important, then, as the hot water was always at hand, and its uses were already well known to the hat maker, the wetting of the covering cloth with it was either implied, or must have obviously suggested itself to a reader of the prior description who was skilled in the art. The second answer was a sufficient one, whether the first was or not.

In equity. Bill for infringement of a patent for an invention.

This case was heard upon the complainant's application that process of contempt should be awarded against the defendant for breach of a special injunction, and for breach of the further injunction included in a short decree against him, that the complainant's bill be taken as confessed. It was agreed that the question of infringement should be open to contestation, as if no decree pro confesso had been entered.

In the following statement, the pages noted are those of the report of the case of Burr v. Duryee, in the supreme court (1 Wall. [68 U. S.] 531–581), and the references by letters are to the several drawings or figures in that report.

In the machine for making hat bodies, the fur is disintegrated by a horizontal picker, whose revolutions are, it is said, two thousand, more or less, in a minute. The fibres of disintegrated fur which compose the bat are deposited upon the surface of a revolving perforated cone (page 558, Fig. 12), beneath which a fan partially exhausts the air. This

partial vacuum causes an atmospheric pressure, above and around the cone, forcing the fibres towards it, and retaining them upon it. There was no authenticated measurement of the ordinary intensity of this atmospheric pressure; nor was there any evidence of the ordinary number of revolutions of the fan in any given time. The original patent of Wells (A. D. 1846), whose administratrix is the complainant, states that it had long been essayed to make hat bodies, by throwing the fibres of fur, wool, &c, by a brush or picker cylinder, into a perforated cone, exhausted by a fan below, to carry and hold the fibres thereon by the currents of air that rush from all directions towards and through the apertures of the cone, and thus form a bat of fibres ready for hardening and felting. He added that all these attempts had failed. The experiments to which he referred as having failed had been made where no mechanism was interposed between the rotating picker and the revolving perforated cone. Such of the fibres as reached that part of this intermediate open space which was near the cone were deposited on it through the suction caused by the atmospheric pressure. The defect of the machine was the absence of a proper instrumentality to prevent previous divergence of other fibres in those parts of the open space which were nearer to the picker. To economize what was thus wasted, and regulate the distribution of the fibres upon the cone in the different quantities required for varying the thicknesses of different parts of the bat, Wells (see the drawing on page 543) enclosed the picker, F, in an air chamber, M, extended so that its outlet, q. s., was near to the cone, O. This chamber he called a "tunnel." His original patent describes a brash or picker, F, whose back revolves downward, as the upper arrow indicates, and whose front, of course, revolves upward. This picker, F, is fed by a regulated supply of fur from behind, b, b′, c, d. The fibres, as liberated from the picker, pass down a curved surface below the same upper arrow, towards the bottom of the tunnel, M. In consequence of the encasing of the picker, F, the supply of air would fail if the deficiency were not provided for. The supply is received from behind, through a narrow aperture, N, at the bottom of the tunnel (See the lower arrow.) Here an inward current of air, produced by the rotation of the picker, is thrown by this rotation forward and upward into the tunnel, and expands within it. The air slit, N, though not an independent invention, was an important incidental part of the tunnel. From this

entrance the current of air, "induced," as the original patent states, "by the rotation of the brush, F, and the partial vacuum in the perforated cone, O, *prevents the fibres of fur from falling and resting on the bottom of the chamber, M, and carries them on to the perforated cone."* The *"chamber or tunnel"* is described as *gradually changed in form towards the outlet,* where it assumes a shape nearly corresponding to a vertical section passing through the axis of the cone, O, but narrower than the cone, "for the purpose of *concentrating and directing the fur* thrown by the brush into the cone." The original patent also states that the *top,* R, of the chamber "is *gradually elevated, and the sides contracted to make the delivery aperture,"* i. e. the outlet of the tunnel, *"nearly of the form of the cone, but narrower and higher,"* &c. At the bottom of the outlet, was a hinged flap, q, to regulate the delivery of the fibres; and the upper part was provided with a hinged hood, s, which, whether operated by hand or by machinery, was carried up and down, to direct the discharge of the fibres, and distribute them properly on the cone, O, with the varying thicknesses required for different parts of the bat.

The patent, having been several times surrendered and reissued, and having been extended by the commissioner of patents, and afterwards further extended by congress (14 Stat. 637, 638), was again reissued in 1868. In this last reissue, the tunnel's bottom, sides, and top are described separately, as if they were disjoined plates, and the office attributed to each of them is explained separately; after which the description states that they *"are all united along their edges,"* in the machine illustrated by the accompanying drawings. The original model, however, in which they compose a single entire tunnel, as described in the original patent, remains in the patent office, to show the meaning of the new phrase "united along their edges." Of this tunnel, as originally patented, the novelty and great utility have never been disputed. Under this head, if the case depended upon the original patent alone, the only question would have been that of infringement. In the machine whose use by the defendant was complained of as contumacious, the revolution of the face of the picker nearest the cone was downward. He used, as a substitute for the tunnel, an uncovered plate or board in front of the picker. On each side of this board was a raised edge, inclining inward. The board, as the defendant contended, was of such a curvature and inclination as coincided in theory with an appliance called a "fur director," described in a patent granted in 1860 to Boyden. The supreme court had, it was contended, decided in Burr v. Duryee, 1 Wall. [68 U. S.] 531, that the use of such an appliance was not an infringement of the patent to Wells. The machine in which Boyden's fur director was used is represented on page 549, and there is a drawing of the fur director separately, on a larger scale, at foot of page 560 (Fig. 21).[2] The revolution of the front of the picker, D, was downward, and in front of it was the fur director, F. The rotation of the picker was thus in the direction opposite to that of the picker of Wells; and the primary direction of the current of air produced by the rotation of Boyden's picker was consequently forward

and downward, instead of forward and upward. But the downward current of air was received directly in front of Boyden's picker, D, upon the surface of his fur director, F, which was an uncovered curved plate, so inclined upward, as gradually to change, in part, the direction of the aerial current. The plate was described in the patent of Boyden as so bent or curved that its surface would have a certain relative position with the axis of the picker, D, and the surface of the cone, D, and give such a direction to the fur, as the latter was thrown on it by the rapid motion of the picker, that the fur would be drawn properly on the cone by the exhaust or suction within it. The plate, F, was described as of a compound curvature, longitudinal and transverse. Its highest point was at the centre, and the longitudinal curvature was gradually downward and upward on each side of the centre, with a slightly concave form. The transverse curvature corresponding with the surface of the cone, B, was described as follows: "The highest and central part of the plate, F, has its surface in line, or in a plane, which bisects longitudinally the axis of the picker, D, and strikes the apex of the cone, B; and the surface of the plate, F, at each side of its centre and highest pointy is formed of portions of planes which bisect longitudinally the axis of the picker and points on the cone, extending down to its base." The following additional passages may be quoted from Boyden's patent: "The picker, D, by its rapid rotation, conveys the fur around on the plate, F, which, in consequence of its being curved, as described, causes the fur to be projected towards the cone, B, in a series of planes extending from its apex to the base, the exhaust or suction within the cone drawing the fur on it, after the proper direction has been given to the fur by the plate, F, the velocity of the picker being sufficiently great to project the fur within the influence of the exhaust of the cone. * * * This peculiar curvature of the plate, F, not only gives the proper direction to the fur, so that the latter may cover the cone, but it also directs the fur to the cone in proper quantity,—for instance, the central and highest part of plate, F, is comparatively a short curve, and directs a small quantity of fur to the upper part of the cone, where but a

small portion is required; but it will be seen that the lower part of plate, F, has a double curved surface to supply the cone, one at each side of its centre, so that the cone will be properly supplied, the supply gradually increasing from the top to the bottom of the cone. * * * The plate, F, is gradually elevated at its outer edges, or towards the cone, from the positions above stated, in order to compensate for gravity; the latter serving to counteract, in a measure, the power of the exhaust and that of the picker, and give a downward movement to the fur. By slightly elevating the direction of the fur above its otherwise proper path, due provision is made for such a contingency."

What Boyden claimed as his invention was "the fur director or plate, F, curved or bent substantially as shown, and arranged in relation with the cone, B, and picker, D, to operate substantially as and for the purpose set forth." The fibres are so volatile that their escape from the machine of Boyden, as hitherto described, would cause great waste. It is diminished by his appliance of a concave piece, G, so connected with the inner lower end of the plate or fur director, F, as to form a semi-circular close cavity under the picker, D, and, in the words of his patent, permit any fur that might escape down between the plate, F, and picker, D, to be brought up by the picker so as to be again projected on the plate. The material is thus economized. This concerns the useful effect of the whole machine, but not the mechanical effect of the fur director, considered as alone the part here in question. Whether Boyden's machine, with the and of this lower chamber, economizes the material sufficiently for practical competition with Wells's machine, was treated in the argument as unimportant, unless where explanatory of supposed motives of alleged infringement. If the board used by the defendant was proportioned as the fur director, F, in Boyden's drawing (page 549), the length from its inner to its outer end (towards the cone) would not exceed about four inches. The actual extension of the defendant's board in this direction is about eight inches, this being rather more than a fourth of the whole distance of the circumference of the picker from the middle of the nearest surface of the revolving cone.

When the bill in this case was filed, the defendant used, where this board or plate now is, a system of adjacent curved metallic flexible plates of which the extension towards the cone was not less prolonged. In a case of Jaques v. Weeks, tried at law in the circuit court for the Southern district of New York before Judge Woodruff, in January, 1871 [case unreported], such a use of like plates was found by the verdict of a jury to infringe the complainant's patent; and that court afterwards entered judgment upon the verdict. The present defendant, not conceiving himself at liberty to disregard this decision at New York, ceased to use the plates. Afterwards, assuming that the decision was not reconcilable with the prior decision of the supreme court, unless he was at liberty to use a fur director of some kind, and not conceiving shortness of such an appliance to be essential

to its proper definition, he substituted the present board. Upon this, the first question of contumacy arose.

In the original patent of Wells, and in the complainant's reissue, the claims of invention are differently expressed. In each, they are multiplied as for inventions of combinations variously described. But novelty can be properly alleged of two subjects only. One of them, the tunnel, has been fully described. The other is a covering cloth, which, wet with hot water, is applied to the bat, when formed upon the cone. The complainant's patent if it was valid under this head, had been infringed. The question was only upon the novelty of this latter claim of invention.

In the complainant's reissued patent, it is stated to be well known that the application of hot water to a bat of fur fibres which have been suitably prepared to be made into hats by the well known felting process, is to partially felt the bat so that the fibres will hold together. This must be understood with reference to the state of the art at the date of the original patent. That patent also states that after the proper supply of fur has been deposited on the pervious cone, the non-united fibres are there held, in the form of a bat, only by the pressure of the surrounding air induced by the exhaustion of air from the inside of the cone, and hence, if, in that condition, the operation of the exhausting mechanism should be suspended, the fibres would be no longer held by the surrounding air, and would, by force of gravity, fall and destroy the bat. To prevent this, and render the bat available in the manufacture of hats, a flexible cloth is used. "The attendant takes from a kettle of hot water a piece of felt, or other cloth, rolled upon a roller, and applies one end of it to the surface of the bat still held by the pressure of the surrounding air, and, as the cone rotates, the felt cloth winds from the roller on to the bat; and, as the tip of the cone is semispherical, and this cloth cannot be conveniently extended over the tip, another piece of cloth, also taken from hot water, is applied to the tip of the bat." In this condition, the specification states, that "not only could the cone be safely removed from the machine, but the bat could be safely removed from the cone by careful handling." But in order "to harden the bat to a state of greater consistency after the wet cloths have been applied, * * * a strong perforated metallic cone is put over the cloth, and the whole is then dipped in hot water; and after that, the bat can be removed from the cone, and handled without the necessity of much care." The specification then describes an inner sustaining cone, and explains how it may be dispensed with. The claim under this head in Wells's original patent of 1846, was "covering the bat with felted or fulled cloth before it is removed from the

cone, or former, as described." What is claimed in the present reissued patent of 1868, is, "in combination with the pervious cone provided with an exhausting mechanism substantially as described—the covering cloth, wet with hot water, substantially as and for the purpose described."

Upon the question whether this was, in 1846, a novel invention of Mr. Wells, the defendant put in evidence two prior patents. Hurlbut's patent (A. D. 1831) was for the use of a vibrating exterior she, to harden hat bodies. His claim was for admitting steam into the cone upon which they were formed, and also for covering this cone with the cap or shell. The cone upon which they were formed was perforated with holes, and when the web which constituted the body was wound upon the cone it was "covered with a cloth;" and over the whole was put the vibrating cap. Ponsford's English patent (A. D. 1839) was published in print before any invention of Wells. Ponsford's improvements were, as he said, communicated by a nonresident foreigner. The improvement in the manufacture of hats, thus communicated, consisted, Ponsford said, in forming the felted bodies of hats wholly with cattle hair, or of cattle hair mixed with other materials after being prepared in a certain manner. He stated that hat bodies had been made of felts manufactured from wool and furs both separately and mixed in various proportions, but that he was not aware that a felt made wholly or in any considerable proportion of cattle hair had ever been applied to the malting of hat bodies. He then described as follows the manner in which cattle hair was recommended by his informant to be felted and formed into hat bodies, viz: The hair being cleansed or prepared should be passed through a blowing machine such as was in common use, and then formed into a bat or fleece by means of mechanical arrangements founded on the principle of exhaustion, that was to say, the hair, as it passed from the blowing machine was to be tossed or thrown into the air from which it was to be sucked or drawn down upon hollow perforated cones or moulds of metal or wool, with an exhausting cylinder beneath. He added: "When the hair has been received on one of these perforated cones or moulds to a sufficient thickness, a cowl of linen or flannel is to be drawn gently over it, and then a hollow perforated cover of copper, or any other suitable metal is to be dropped over the cowl; the cone or mould is then to be immersed in a vat or tub of boiling hot water, and there allowed to remain for about a minute, after, which it is to be taken out, and the metal cover, and flannel or linen cowl, removed, when the bat or layer of hair will be found felted to a degree that it may be readily finished off by the workman, in the usual manner, at the oven." The supreme court, after a remark that the complaint of infringement under this head had not been much insisted on, said: "The respondents contend that it is void, being for the same invention patented to Ponsford in England in 1839, and known to Wells, who was at the time in England. This allegation we find to be fully supported by the evidence, and decided accordingly." 1 Wall. [68 U. S.] 577, 578. That Wells was in England, or what

he knew, was not proved in the present case. But this was immaterial, as the patent of Ponsford had been published in print. The important observation was, that Ponsford's was the same invention. This observation of the supreme court, lost, however, a great part of its force because the decision was upon Wells' patent as reissued in 1860, in which reissue the claim of invention under this head, whatever might have been its merits, was not so expressed that it could be supported. The complainant opposed three objections to the sufficiency of the description contained in Ponsford's patent: (1) that the subject of this part of his patent was not fur but hair; (2) that what Ponsford suggested was useless, because a "cowl," properly so called, could not be used without such abrasion of the newly formed bat as would have ruined it; (3) that he did not suggest that the cloth or cowl should be wet with hot water, or wet at all.

Mr. Dickerson and Mr. Myers, for complainant.

Mr. Collier, for defendant.

CADWALADER, District Judge. I am of opinion that the defendant is infringing the complainant's patent for the air chamber. But in so deciding I have been embarrassed, because, in the argument for the complainant, the authority of a judicial precedent has not been fully attributed to the decision of the supreme court, reported in 1 Wall. [68 U. S.] 531. The question of the authority of this decision has been confounded with some correct, but inapplicable, propositions upon the inconclusiveness of a judgment, except as between the litigants. To have contended that the propositions discussed by counsel in that court are inapplicable to the present form of the question, and that the experimental operation of the museum of machines there exhibited (see page 578) may not have represented their ordinary working condition, would, however, have been a fair and proper course of argument. I have also been embarrassed, because, since the inventor's death, the subject has been obscured rather than elucidated in reissues of the patent. Whether the reissue of 1868 could be sustained without reference to the original drawings and models, and to the original patent of 1846, remaining of record, is perhaps doubtful. But the reissued patent, aided by the model, &c, may, I think, be sustained. Therefore it will not be necessary to note any intermediate surrenders and reissues, except occasionally. The case will be considered: upon the assumption, that whatever Wells invented is well patented. To relieve my own mind, of such embarrassments, I have

prefixed a statement of the case, which maybe considered as an introductory part of this opinion.

In the machines which have been exhibited or described, the current of air produced in front of the picker, by its rotation, was upward or downward as the rotation was upward or downward. Until the invention of Wells, there was no mechanism to control or change this primary direction of the air. Either the upward or the downward current of air was divergent from the proper direction. This direction should have been towards the revolving cone. A flow of air in any other direction scattered and wasted the fibres. The remedy for this divergence was an instrumentality which would conduct, or direct, the currents of air from the front of the picker towards the cone, till the fibres were brought so near to the cone that the force of suction towards it would sufficiently predominate. Here the distinct meanings of the words "direct" and "conduct" should not be disregarded. An additional purpose for which a new mechanism was required may be explained by observing that an ordinary hat should be thicker at the band than at the crown. The additional purpose therefore was, that the fibres deposited on the cone should reach it in such layers of varying quantity as to make the bat of the varying thicknesses required;—in the language of Judge Woodruff—to give a greater thickness in that part of the bat where thickness was desired, and a lighter deposit of fur where lightness was more desirable than mere strength. The purpose of interposing new mechanism was thus twofold. It was to determine towards the cone the general direction of the flow of air from the picker, and also to regulate the different thicknesses of the bat from the base to the top of the cone. The first person who interposed any mechanism to effect this twofold purpose was Mr. Wells. It was therefore assumed, after his death, by an assignee of the patent, that the use of any interposed mechanism which produces like useful effects, must infringe the patent, whether the mechanical effect was the same or not, and whatever may have been the mechanism used. This was a mistaken supposition, as the supreme court has decided. The twofold useful purpose may be effected more or less by either of two different mechanisms. One of them is an air chamber, called a "trunk" or "tunnel," to conduct the flow of air in which the fibres pass from the picker towards the cone. The other is an unenclosed short plate, or system of short plates, which may be called a "fur projector," placed in front of the picker, and so formed as to turn the currents of air initially in the direction required, in order that they may project the fibres towards the cone. The air chamber was the invention of Wells, who designated it as a "tunnel." The fur projector was a much later invention of Boyden, who gave to it the less appropriate designation of a "fur director." The two phrases will hereafter be used indiscriminately. The air chamber enclosed the currents of air which would otherwise have diverged from the proper direction, and conducted them so as to deposit the fibres in layers of the varying thicknesses required. The form and adjustment of the tunnel, with its auxiliary and incidental

appliances, were sufficiently described in the original patent of Wells. The tunnel was considered by the supreme court the great and peculiar characteristic of the invention. 1 Wall. [68 U. S.] 571. Its novelty and great practical utility are unquestionable. Whether the machine, as patented, was automatic, and how nearly others may have made it so by subsequently improving its form and adjustment, or by any new invention, are immaterial questions, unless upon the measure of damages for an infringement.

On the question of infringement there is, of course, no difficulty where any contrivance or adaptation has been used for wholly or partly enclosing and conducting the stream of air in which the fibres pass from the picker, so that they may arrive where the draft caused by the fan will sufficiently attract them to the cone. There may be other infringements less obvious. Thus a tunnel may be much abridged, and may yet infringe. And there may be an infringement where the passage from the picker towards the cone is only partly enclosed, or is even wholly uncovered. In the machine used by the defendant, and, so far as I know, in all the machines upon which questions of infringement of the patent have been litigated, there was no top or cover of what supported or deflected, conducted, directed or projected, the air in which the fibres passed from the front of the picker towards the cone. This absence of the top or cover will here be explained. In all of these machines, the revolution of the front of the picker has been downward. The front of the picker of Wells, on the contrary, revolves upward. From the bottom and front of his picker the direction of the flow of air is forward and upward; and this direction afterwards continues unchanged. In the other machines, the different direction of the rotation of the picker causes the primary direction of the flow of air in front to be forward and downward. But, in all of them, the primary direction of the aerial currents downward is immediately more or less changed upon the surface of a gradual deflector of some kind, whose inclination is somewhat upward. Neither the difference in the direction of the picker's rotation, nor the consequent primary difference in the aerial current's direction, can, in itself, affect the question of infringement. But the gradual deflection upward of this aerial current, causes a pressure of the air upon the curved or gradually elevated deflector. This aerial pressure upon the surface of the deflector, though a diminishing one, loses a part only of its first intensity, because the primary direction is not

reversed, but only partly changed. Indeed, the curvature may be such that the intensity of the pressure diminishes very slightly. The air, if thus deflected on the bottom of a trough, retains a great part of its primary downward tendency, with a corresponding pressure opposing more or less its natural expansiveness upward. Such a trough, although without any top or cover, may thus perform, in part, the office of a tunnel or air chamber, in conducting the fibres towards the cone so as to infringe the patent of Wells. The elevation of the sides may thus, also be, in part, or even wholly dispensed with. A flat plate, or board, without elevated sides, may be so inclined and adjusted, and so prolonged in the direction towards the cone as to be an infringement I understand, this to have been virtually decided at law in the case of Wells v. Gill {Case No. 17,394}, tried in the circuit court for the Southern district of New York, before Judge Woodruff, and in a case in equity at the suit of the same plaintiff against the sons and copartners of the same defendant in the circuit court of New Jersey, in which latter case a preliminary injunction was conditionally ordered by Judge Strong with Judge Nixon's concurrence. Upon this decision it may be observed that the last reissue of the patent claims, quite unnecessarily, the bottom of the tunnel, as an invention distinct from that of the sides and the top. The motive was doubtless to cover cases of partial infringement. The defendant in the case in New Jersey, contended that the reissue embraced more than the original invention. But Judge Strong said he was unable to perceive how anything decided in the case in the supreme court determined that what is claimed in the reissue was not embraced in the original invention. Unless, however, the office of the mechanism used is thus (or otherwise), in whole or in part, that of such a tunnel or chamber as the patent of Wells describes, there can be no infringement of his patent. It is only for the mechanism devised by him. Alternative but different mechanisms which produce in whole or in part the same, or similar useful effects, are not mechanical equivalents in that sense in which their use constitutes infringement. These points the supreme court has decided as questions of law.

The fur projector, whether formed of one plate, or composed of several, does not, like the tunnel, enclose aerial currents; nor does it, like the trough, or like the supporting plate, sustain them during any continued flow. In all cases in which the fur projector may be mentioned, it will be assumed that the picker's revolution is downward. Immediately in front of the picker, the fur projector receives the downward current of air, changes the primary direction of this current, and initially determines the planes of its ulterior direction. The mechanical theory is twofold: First, that of a projectile force of air towards the cone, or a theory somewhat analogous, the general direction of the air's motion, which was downward, but is gradually, turned upward, being so determined initially by the projector, that the fibres are borne forward, beyond the projector, in the aerial current, towards the cone, till they arrive where suction sufficiently attracts them to the cone; and secondly, dividing the same general aerial current initially into such planes that the quantity of the

fibres, in the several paths of their trajection, will be greater as the zones of the bat upon the cone approach its base. The latter twofold theory has been applied in machines in which curved stationary plates in front of the picker have had a gradual inclination upward. This inclination was increased slightly to compensate for gravitation of the fibres in their trajection through the open air. Boyden's patent, A. D. 1860, described the projection as upon a single plate, inclined upward, and of both a longitudinal and a transverse curvature. This plate was described in his patent as in front of the picker; and so bent or curved that the surface would give such a direction to the fur, as thrown on it by the rapid motion of the picker, that the fur would be drawn properly on the cone by the exhaust or suction within it. The plate was curved longitudinally so as to have its highest point at the centre, and was gradually curved downward and outward at each side of its centre with a slightly concave form; and was curved transversely in a series of steps descending from the centre in such planes that the cone might be fed with a supply of fibres gradually increasing from top to bottom.

The point decided by the supreme court was, that the use of Boyden's machine, as heretofore described, was not an infringement of the prior patent of Wells. Boyden's patent prefatorily described his invention as an improved mode of directing or guiding the fur to the cone, whereby trunks and all other comparatively complicated appliances theretofore used for the purpose were dispensed with, and what he called an exceedingly simple and efficient device substituted. Here the word "trunks" was obviously intended to refer to, or include the tunnel of Wells; and Boyden's plain meaning was, that what he had contrived, or devised, was actually intended by him as a substitute for that tunnel. It was therefore argued, that his declared purpose was to evade the right of Wells by the mere substitution of a mechanical equivalent. But the supreme court, not contradicting this, considered it unimportant, saying that, "every man has a right to make an improvement in a machine, and evade a previous patent, provided he does not invade the rights of the patentee." Page 574. That court also said that the phrase "equivalent" and other phrases were often used in such a vague and equivocal manner that they mystify and lead many to absurd conclusions who will not distinguish between things that differ. Page 572. The court said: "The machine of Boyden has not one of the peculiar devices, or combination of devices, of the Wells machine, nor any substantial identity

with it, unless by substantial identity, is meant every machine which produces the same effect. * * * That two machines produce the same effect will not justify the assertion that they are substantially the same, or that the devices used by one are, therefore, mere equivalents for those of the other. There is nothing in the Wells machine, or in its devices, which suggests the peculiar device employed by Boyden." Id. In order to determine the effect of this decision, it is necessary to read more than the report in 1 Wallace, which, though very able, is too condensed to give a full view of the question. The printed record contains seven hundred pages. The remarkable brief of one of the counsel mentioned in the reporter's note (1 Wall. [68 U. S.] 532, 533) contained eighty-six closely printed pages, and seventeen plates, many of them with several figures, besides twenty-one wood-cut figures. The references in the record were not to plates, or wood cuts, but to models, and working machines, of which "a large museum" was exhibited in court See pages 532, 578. The extracts from Boyden's patent in the report are not quite full enough to convey to the mind sufficient ideas of his machine.

The important question is, what was, in principle, the decision of the supreme court? It was, I think, that Wells's exclusive right was not infringed by any substitution of a mechanism which, without enclosing, or continuously supporting, the motive air, merely determined its direction from the front of the picker so as to project unsupported fibres through an open space towards the cone.

A great deal has been said upon the question whether appliances to prevent lateral efflux of the fibres from Boyden's fur director, which I call "fur projector," would make it infringe the patent of Wells. In the present case, the curved board, which the defendant substitutes for the fur director, has, on each side, a raised edge of small, but appreciable height, and inclining inward. Where several plates are used, they may be so bent and inclined as in like manner to prevent lateral efflux. It is not material to inquire whether Boyden's machine, as exhibited in the supreme court, had any such lateral appliance, or any device of a similar tendency. Where a fur projector is not of improper dimensions, this mere prevention of lateral efflux cannot be important on the question of infringement. If the board of the defendant's machine was not prolonged beyond the extension required for simply determining the direction of currents of air from the front of the picker towards the cone, the elevated edges would, at most, only assist in determining such direction. If the function of the board was thus limited, these edges would not have caused it to infringe. The defendant contends that the board or plate used by him is, in principle, that of Boyden. This depends upon the question how nearly the board approaches the point or line where the force of aerial projection becomes inappreciable, or where the force of atmospheric pressure predominates.

On reaching, now, the true question to be considered, it should be premised that the difference between "conduction" and whatever may be called "projection" or "trajection,"

does not in other cases, depend ordinarily upon questions of measurement But, in the machines in question, so short is the path of the fibres, after they leave the picker, until the force of suction towards the cone predominates, that a change in relative proportions and distances, may, with or without a difference in the measures of the respective forces of aerial projection and atmospheric pressure, involve a difference in mechanical principle. Thus, if a so called "fur director" is elongated towards the cone, and supports the air which carries the fibres forward until the force of atmospheric pressure, impelling them to the cone, predominates, they are not projected by and through the air. In such a case, the mechanical theory of Boyden either ceases wholly to apply, or the distinction between his mechanism, and that of Wells, ceases to be a practical difference. The experimental operation of the machines which were exhibited in the supreme court however fairly the experiments may have been made, was not likely to develope this proposition, or to explain its application. The experiments were exhibited on the part of the defendant whose only business it was to displace the complainant from the broader and independent position which he had taken. He had staked his case upon this broader question; and, on its decision, was content to stand or fall. Upon this question it mattered not whether aerial projection or atmospheric pressure was, at any point or line, the dominant force. Differences hereafter suggested as material would probably, therefore, not have been observed from the bench in witnessing those experiments. Let it be assumed, for example, as to Boyden's machine, that the normal force of aerial projection is that which is due to the picker's velocity of, say, two thousand revolutions in a minute; the effect of this velocity of rotation being somewhat reduced by the subsequent deflection upward of the currents of air. Let it also be assumed that the normal intensity of the atmospheric pressure upon the revolving perforated cone is that which is due to a certain weight Let it be supposed, also, that the maximum velocity of the picker's rotation, disregarding differences in diameter, may be three thousand revolutions in a minute, and the minimum atmospheric pressure on the cone may be that which is due to one-half of the weight above supposed. The figure on 1 Wall. [68 U. S.] 549, corresponding with a drawing annexed to Boyden's patent, may then be considered as representing normal proportions of the machine, in one of its proper working conditions, when the picker and the exhausting fan each moves with its ordinary velocity. As the normal velocities or the picker and the fan respectively should, perhaps, always be approximately maintained when the machine is at work, it might not be correct, as to a working machine, to say that

there is a minimum velocity of the picker which is only from one thousand to fifteen hundred revolutions in a minute, and a maximum atmospheric pressure on the cone equal to double the first of the supposed weights. But in the experimental museum of machines exhibited in the supreme court, the difference between the degrees of intensity of atmospheric pressure would not have been observable; and a difference between sixteen and thirty-three revolutions of the picker in a second might not have been observed. Nor is it probable that a shifting of the position of the cone, bringing it a few inches nearer to the picker, would have been discerned from the bench. These changes might, however, almost, if not quite, convert the fur projector into a conducting trough.

Leaving the experiments exhibited before the supreme court, we may next consider a working machine whose picker and exhausting fan respectively move with normal velocities, which are constantly maintained; and we may assume that the proportions, and the relative distances of the parts of the machine correspond approximately with those on the same drawing on page 549, except that the so called fur director, being elongated towards the cone, is of twice the length of the fur director which is represented in the drawing. This would nearly coincide with the proportionate length of the board used by the defendant. Its length is within a small fraction of eight inches, occupying more than a fourth of the whole distance between the periphery of the picker and the middle of the nearest surface of the revolving cone. We do not know the velocity of the fan or that of the picker. The current of air in front of the picker was, when I saw it, apparently feebler than might, from inspection of the drawing annexed to Boyden's patent, be the supposed available aerial force. But this impression upon the mind of so inexperienced an observer, cannot be relied on. There is less uncertainty in considering the proportional measurement of the board. Such a measurement might, in some cases, be no sufficient criterion. But, in others, it may suffice to determine whether such a plate is a fur projector in truth, or is elongated so as to be a mere conducting air trough. If this plate had extended outwardly only four inches, or a very little more, I would not have considered it an infringement. If it had been extended farther, within what limit there is no present occasion to determine precisely, the case perhaps could not have been decided until after a special reference on the question of infringement. Under such a reference, to a commission of experts, or to a master, the question might, I suppose, be determined experimentally in some very simple manner. A theoretical determination perhaps could not be made without considerable difficulty; and experimental shifting and adjustment would probably be necessary before the most correct abstract theory of such a machine could be applied or tested.

The question, as it stands, may be safely decided by the court upon the actual extension of the board. Inspection of the defendant's machine, when in operation, shows convincingly—First, that if the board had extended outward only four inches, the waste of the fibres would have been immense; and, secondly, that, in the working condition of the

machine, the present board reaches a point, or line, where the force of suction towards the cone predominates. I am of opinion that this board is not a legitimate fur projector, but is a conducting air trough in disguise, and that its use infringes the complainant's patent; and that it had been likewise infringed by the previous use of the curved metallic plates in the same part of the machine. In Wells v. Jaques [Case No. 17,399], a similar undue prolongation of such plates towards the cone would have been a sufficient reason for letting the verdict stand. The judgment in that case was thus consistent with the prior decision of the supreme court. If there is, in Boyden's patent, language of any such import that the so called fur director, although thus elongated, might seem to be included in his claim of invention, there is nothing in the decision of the supreme court, to support the pretension. The principle of Boyden's machine, as defined by the defendant's counsel whose argument prevailed in that court, was that the particles of fur and air were susceptible of having sufficient momentum imparted to them, to be projected for definite distances and definite directions through the open air. 1 Wall. [68 U. S.] 561; Mr. Harding's Brief, p. 41. The word "project" is used more than once in the patent with no other meaning. It has already been stated, that the question was not involved in the contention upon the other side in the supreme court. If the extension of a fur director towards the cone, was greater proportionally, or the distance between the picker and the cone was less proportionally, than in the drawing, or model, it may be doubted whether the complainant's counsel would there have attributed importance to such a difference. But not a word in the opinion, or in the reasoning of the supreme court, excludes the consideration of such a difference here, if it is really material. On the contrary, the supreme court said expressly, that Boyden's machine had, as an improvement, more claim to originality than that of Wells. Page 572. This would not have been said if the so called "fur director" had been considered as a mere trough conducting the air. If it be suggested that Boyden's patent was, not for a fur director, which merely projected the fibres, but for a fur director so formed as to conduct them on it until they reached the point or line where the force of suction predominates—such fur director meanwhile preserving the inclination and curvature described in his patent—the suggestion will encounter objections in addition to some which have been already mentioned. One objection is, that his patent provides for so forming the fur director, that "slightly elevating the direction of the fur above its otherwise proper path," compensates

sates for the gravitation of the fibres. Here the familiar figure in 1 Wall. {68 U. S.} p. 562, exemplifies the well known effect of gravity in curving downward the path of a projectile passing through the air. But there is no such path, while the support of the fur director continues. Another objection is, that Wells had prescribed such a form of his air chamber as would coincide with the course of the fibres inside. Therefore the supreme court cannot have attributed novelty to Boyden's fur director simply in this respect. The form of the air chamber of Wells, appears in his drawings and model, and was described sufficiently in the reissued patent of 1860, upon which the case before the supreme court depended. The words of the original patent of 1846, which are fuller, and more precise, were, in this respect, carefully considered, and in part quoted by the supreme court. Page 566. Referring to those parts of the specification of 1846, which are quoted and italicized in the foregoing statement of the case, and bearing in mind, that the back of the picker, as there described, was revolving downward, and its front was revolving upward, the coincidence in the form of the chamber with the course of the air in it, is clearly indicated. The only function of the fur director to which the supreme court's opinion can be referred, is therefore, aerial projection of the fibres. Though the present use of the board in question thus infringes the complainant's patent, I do not believe that the defendant has been willfully contumacious. Nor do think it surprising that he has misunderstood the question of the complainant's right, if I have succeeded in defining it correctly. The complainant should not suffer from the defendant's mistake. But it should not be visited with any penal consequences, if prompt reparation is made.

The question of infringement by the use of the hot wet covering cloth remains for consideration. This question is resolvable into three points mentioned at the close of the above statement of the case. Upon these points I am of the following opinion.

First. The hair was to be previously disintegrated; and the alternative use of disintegrated fur would have occurred to the mind of any reader, even though it had not been suggested, as it was, elsewhere in Ponsford's patent.

Secondly. If injurious abrasion would have occurred from the use of a cloth sewed in the form of a cowl, any person of the least skill in the art, would have known it, and would, therefore, have understood the use intended as that of an open cloth, to be gently folded in the form of a cowl, upon the bat.

Thirdly. It appears to have been proved experimentally, that the cowl could be thus formed in the first instance of a dry wrapping cloth. As this wrapper and the bat, and the inner and outer cone were by Ponsford's direction, to be at once immersed in the boiling water, the difference between a wet and a dry cloth wrapper, was perhaps, of little importance. If it was important, then, as the boiling water was at hand, and its uses were already well known to the hat maker, the wetting of the covering cloth with hot water, was either implied, or must have obviously suggested itself to any reader of Ponsford's

patent, who was skilled in the art. Therefore, this use of such a cloth was not novel at the date of Wells's patent.

The defendant has, however, by making and using the board in front of his picker, infringed the complainant's patented exclusive privilege, and violated the injunction; and is therefore adjudged in contempt. But no attachment or other process will issue upon this adjudication till after a definitive consideration of what may be necessary in order to purge the contempt. If the defendant at once files a sworn account, such as would be requirable of him before the master under a reference upon a decree for an account, process of con tempt will probably not be asked for by the complainant. Upon the filing of such an ac count, the complainant may apply for a reference. And either party may apply at any time, for further directions.

[1] {Reprinted by permission.}

[2] On page 550, line 8, the omission of a number after the word "figure" might mislead the reader into a belief, that the intended reference was to the figure on page 549, whereas, it appears, on reading Boyden's patent, that the intended reference on page 550, line 8, was to lie figure which is mentioned as No. 21, in another Connection, at the foot of page 560.