party in such controversies. The maxim, "*in pari delicto potior est conditio defendentis*," must prevail.

DECREE AFFIRMED WITH COSTS.

BURR *v.* DURYEE.

1. The practice of surrendering valid patents, and of granting reissues thereon in cases where the original patent was neither inoperative nor invalid, and where the specification was neither defective nor insufficient—the purpose being only to insert in the reissue expanded or equivocal claims—is declared by the court to be a great abuse of the privileges granted by the thirteenth section of the Patent Act of 1836, authorizing a surrender and reissue in certain cases, and is pointedly condemned.
2. As the Patent Act grants a monopoly to any one who may have discovered or invented "any new and useful art, *machine*, manufacture, or composition of matter," and as a machine is a concrete thing, consisting of parts or of certain devices and combinations of devices, a patent must be granted, in cases where the invention comes within the category of a machine, for *it*, and not for a "mode of operation," nor for a "principle," nor for an "idea," nor for any abstraction whatsoever: and this rule of law is not affected by the fact that the statute requires the patentee to *explain* "the mode of operation" of his peculiar machine which distinguishes it from all others.
3. The machine patented to Seth Boyden, January 10, 1860, for an improvement in machinery for forming hat-bodies, is no infringement of any of the patents granted to Henry A. Wells for the same thing. The patents to Wells, so far as they related to an improvement in the *process* of making hat-bodies, were void; William Ponsford having invented and patented the thing before him, and Wells having seen Ponsford's invention.

APPEAL from the Circuit Court for the District of New Jersey.

The complainant, Burr, as assignee of a patent granted to Henry A. Wells for "an improvement in the *machinery* for making hat-bodies, and in the *process* of their manufacture," filed a bill in the court below against Duryee and others for infringement. The patent to Wells was granted originally April 25, 1846. It was surrendered in 1856, and reissued in two separate patents; one for the improved *ma-*

chine, the other for the *process*. In the spring of 1860 these patents were extended, and afterwards, December 3, of that year, they were surrendered and reissued with what were alleged to be *amended* specifications; the bill being filed on these reissues of 1860, numbered respectively No. 1086 and No. 1087; the former for process, and the latter for machinery. The court below dismissed the bill, and the case came here by appeal.

The chief questions in this court were in effect,—

1. Whether a certain machine, patented to one Seth Boyden, infringed in terms the machine part of the patent originally granted to Wells?

2. If it did not, whether, under the right given by the Patent Act of 1836 (§ 13), to surrender and have a reissue in certain cases provided for by the act, the owner of the original patent could, by such surrender and reissue of a patent, enlarge its operation in a way which the present complainant sought to do, and which is stated farther on?

3. Whether Wells was the original inventor of the *process* part of his patent?

In their more general aspect, however, the first two questions involved some of the fundamental principles in the law of the issue and reissue of patents; and they were argued elaborately and with great ability on both sides.

The learned Justice, GRIER, J., who delivered the opinion in one of the cases here reported (see *postea*), refers to the "large museum of exhibits in the shape of machines and models" which had "been presented to the court," and which, he states, were "absolutely necessary to give the court a *proper* understanding of the merits of the controversy." Most of them were introduced by the defendant, and they were arranged and explained with admirable clearness by one of his counsel, Mr. George Harding.* Drawings—of

* The whole business of making hats, from the disintegrating of the fur to the production of a hat-body, was actually carried on and exhibited in the court-room; and the printed *argument* of Mr. Harding contained, as "exhibits," the skin of the beaver as it comes from the animal, with specimens of fur as thus exhibited, and also as exhibited in various conditions

which but three can here be given—supply imperfectly originals thus advantageously presented. Without them, however, no idea *at all* can be had of the case; and the reporter trusts that while, from the special difficulty above referred to of understanding the case perfectly, without an inspection of actual machines, he will be pardoned for a statement of it which may be not intelligible to all; he will, on the other hand, be excused for incumbering a book of law reports with drawings, which, in the eyes of a casual observer, will give to it the aspect of a treatise on physical science, more than the aspect of one on the science of jurisprudence.

Any complete understanding of the principles which the case embraces and settles requires some preliminary explanation of the particular art which happened to be the one in which the questions were presented to this court; the art, to wit, of the *hatter*.

EXPLANATION OF THE ART.

Hat-bodies are manufactured out of fibres of fur or wool felted together. The fact that when the fibres of wool or fur are moistened and rubbed together, they would interweave spontaneously and form the fabric called felt, has been known from a remote antiquity. The process of felting is believed to have been anterior to the art of weaving.

In Asia felted wool was used at a very early day for making tents, cushions, and carpets. It was known to the Greeks as early as the age of Homer, and is mentioned by him, and also by Xenophon and Herodotus. Its use was introduced into Rome from the Greeks, and it is mentioned by Pliny. Felt hat-makers appeared in France, in Nuremberg, and in Bavaria, early in the fourteenth century. It had been con-

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and processes, down to the very surface of the "brush" and "napped" hats. No similar argument, perhaps, was ever made in any court of law; nor could a case be explained in a manner more satisfactory. This "clinical" style of argument illustrated perfectly the poet's truth:

> "Segnius irritant animos demissa per aurem,
> Quam quæ sunt *oculis* subjecta fidelibus et quæ
> *Ipse sibi tradit spectator.*"

jectured by Monge, a French *savant*, in 1790, that felting was probably due to small scales on the fibres of fur or wool; but, as nothing of the kind was found by the aid of the microscope, the idea was set aside by Dr. Young and other philosophers. Mr. Youatt, an intelligent English naturalist, in 1835, in investigating the subject of felting, carefully re-examined the fibres of wool, and the fur of rabbits and other animals, under a powerful achromatic microscope, and found that each fibre of fur or wool has its surface covered with serrations or saw-like projections, and that all these serrations pointed in a direction from the root towards the point of the hair. The appearance of a short piece of a fibre of wool under the microscope is shown in figure 1, and the wool or fur of the rabbit in figure 2.* The fur of the rabbit does not exceed in diameter the one-thousandth part of an inch; and in an inch of length of each fibre there are found to be 2880 of these serrations.

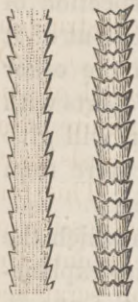


Fig. 1. Fig. 2.

In order that the fibres of fur or wool should felt, it is necessary that the relative position which they occupy in nature should be changed, and the direction of the serrations on the fibres shall be reversed to each other, as shown in figure 3, instead of being pointed in the same direction as in nature. The thorough separation of the individual fibres of fur from each other is one of the first essentials in manufacturing fine felted fabrics; not only for the purpose just mentioned, but also to prevent the formation of lumps. The well-known instruments for separating or disintegrating

Fig. 3.

* The great majority of hat-bodies are made of the fur of the Russian hare, the English or the American rabbit, the coney (a small species of rabbit), the nutria and the beaver.

fibrous material are the carding engine, the picker, and the bowstring.

The carding engine is the most complete and generally used instrument for separating all fibrous material, as wool, cotton, fur, and silk. It is shown on the *body* of the instrument, drawn in figure 6 (page 538); that part of the instrument on the left of the dotted line, and marked F, 2, *c*, *e*, *b*, D, being left off. The carding machine is composed of one central main cylinder, covered with an almost infinite number of fine wire teeth. On the finer qualities of cards there are 79,000 teeth in every square foot of surface. This fine wire-pointed surface turns in contact with a succession of fine wire-teethed surfaces, and between these points the fibrous material is thoroughly disintegrated or scratched apart and separated. When operating on fur a fan (F)—in this plate a rotary fan-wheel—is attached to it, to throw the fur after it has been so separated.

Another mechanism ordinarily used for disintegrating fibrous substances in the arts is the "picker" or "devil," which is shown in figure 10 (page 549), and consists of a series of very short, stiff, metallic teeth or studs, arranged at intervals on the periphery of a cylinder, and which is revolved with great rapidity. It acts by striking or whipping the fibrous material into or against the air with great velocity, and thus scatters it into distinct fibres.

Fig. 4

The bowstring is a vibrating cord, which also acts on the fur in a similar manner to the picker. By being twanged it vibrates, and it whips

or strikes the fibres of the fur or wool a sharp and rapid blow against the air. Felt was merely used as the foundation or body for the hat, which body was first stiffened and then shaped into the figure of the ordinary stiff cylindrical hat; and finally, its exterior surface was made to have the appearance of a glossy fur.

A finished hat was formerly made in the following manner: The "body" or foundation was first made of beaver, or rabbit, or coney fur; *first*, by the fibres being deposited in the form of two triangular pieces by means of the hatter's bow, as shown in figure 4, and then felted by rubbing by hand. In forming the body the skill of the workman directed the fur towards the brim or tip, as was required; it being generally necessary to make the *brim* thick. The bodies were then taken to the kettle, or battery, containing boiling water, where, by the workman's repeatedly immersing the body in hot water, and rubbing it on the shelf with

Fig. 5.

his hands for about the space of an hour, the fibres of fur were forced to interlock or felt. The operation is seen in figure 5. Under this process of "*sizing*," as it is called, the

body shrinks to nearly one-third of its original superficial size, and greatly increases in thickness, compactness, and toughness. The body was then stiffened, either by immersion in a hot solution of glue, or in a solution of gum shellac in alcohol. It was next blocked by being drawn over a cylindrical block and tied at the band, and then felted or stretched so as to make the brim straight. Lastly, the body was dried, and a silk plush covering was stuck on the exterior of it by a hot iron, which melted the glue or shellac.*

THE INVENTION IN MACHINERY AND PROCESS OF MAKING HAT-BODIES.

Prior to 1833 no *machine* had been devised for depositing the fur in a proper manner to form hat-bodies; and the process was effected solely by the use of a bowstring worked by hand, as shown in figure 4.

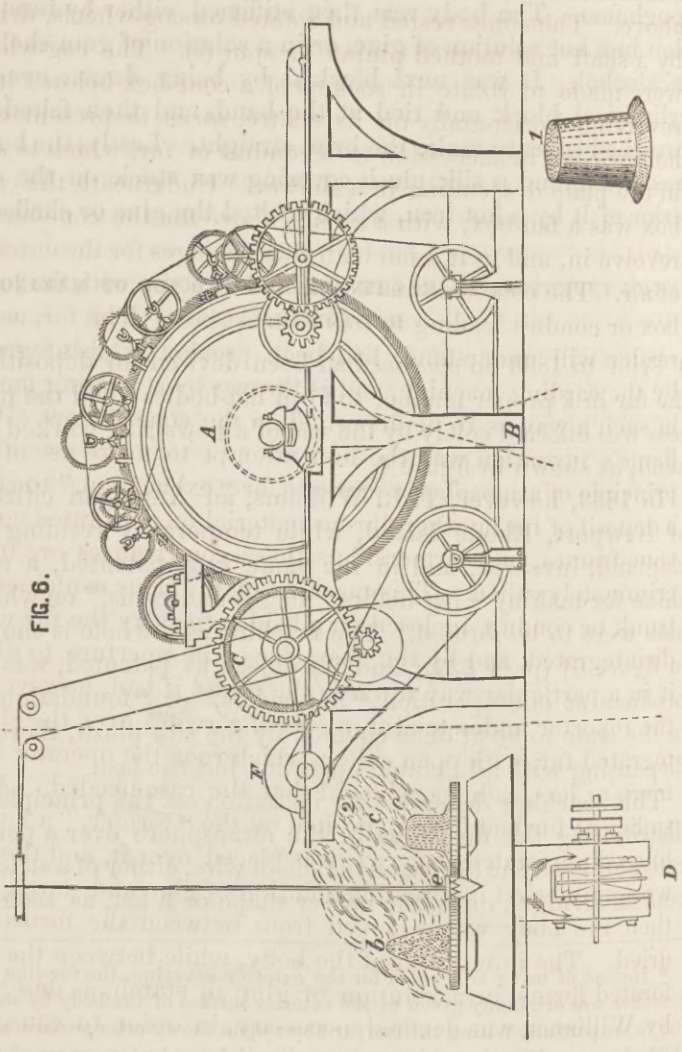
In 1833, however, T. R. Williams, an American citizen, of Newport, Rhode Island, while temporarily residing in England, invented, and in the same year patented, a machine for making "hat-bodies," or "foundations," on which hats were to be formed. The machine as a whole is shown in figure 6† (page 538); and its object, as patented, was to produce at one operation "hat-bodies," or "foundations," in the state to be at once covered by the silk plush, thereby dispensing with all manual operation but the last.

This machine depended for its action on the principle of distributing the fur fibres in the atmosphere over a perforated hollow cone (*b*), usually made of wire, either of a strictly conical form (*b*), or of the nearer shape of a hat, as seen in

* Instead of using silk plush for the exterior covering, the fur-like appearance was originally given to the exterior surface of the body by scalding in, or partially felting the fine fur fibres upon the exterior surface, after the body was stiffened, and before it was blocked, producing a napped surface, and the hat was called a napped hat. At other times the workman, while engaged in sizing the body, by continually brushing the body with a hand-brush, would brush a nap out of its surface. Hats so finished were called brush hats.

† This plate is a copy of one annexed to Williams's patent.

FIG. 6.



the other figure *c*, of the plate; having an apparatus (D) to exhaust the air, and so to attract the fibres of fur to the cone above. The cones rested and rotated on cog-wheels, driven by a shaft and toothed pinion or spur (*e*). The cog-wheels were made to rotate in sockets of a cone-box below; itself revolving horizontally on its centre, so as to present each hollow cone in succession to a conduit of fur, which is seen in the plate descending in a shower. Underneath the cone-box was a fan-box, with a socket above for the cone-box to revolve in, and in it a fan with side passages for the entrance of air. The cone-box was connected by a rim with the lower box or conduit leading to this exhaust-box. The fur, as the reader will understand, had been previously disintegrated by the carding machine, and is thrown by a rotating fan (F) in such a way as to be deposited on the cones below. Williams's invention was the first attempt to make use of the principle of atmospheric pressure, or "exhaustion," to cause a deposit of fur or other fibrous material on perforated cones, cone-frames, or "formers," as these contrivances are indiscriminately called. This machine of Williams contained no trunk or conduit inclosed on all sides to carry the fur when disintegrated, and by the character of its aperture to direct it in a particular way towards the cone; it had, however, as the reporter understood it, a sort of "roof" over the disintegrated fur, with open sides; which roof the operator bent more or less, as he considered that the case needed. After sufficient fur had been deposited on the "former," a hollow hinged perforated cover (1) was placed over it, and the two were immersed in a boiling solution of glue and starch, and then the body was removed from between the forms and dried. The immersion of the body, while between the perforated forms, in a solution of glue or starch, as described by Williams, was deemed necessary, in order to cause the fibres to adhere together after the body was removed from the influence of the exhausting apparatus. The fur fibres, by Williams's process, were so glued or stuck together that they could not be felted afterwards.

In 1839—this date must be observed—a certain *William*

Ponsford discovered, that when a mass of fur or fibrous material capable of felting is disintegrated, and deposited in a condition proper for felting, and is immersed for an instant in very hot water, that the hot water will, of itself, cause an incipient felting of the fibres, so that a continuous fabric of fur of the shape of the "former" can be then removed from the "former" and finished by the hand of the workman; and he further discovered, that if the bat* be surrounded carefully with a soft cloth, its texture will not be disturbed during the operation of immersion, by reason of the water percolating or passing through it. The mode of applying this discovery was described in the English patent of Ponsford in 1839 as follows:

"The hair as it passes from the blowing machine is to be tossed or thrown into the air, from which it is to be sucked or drawn down upon hollow perforated cones or moulds of metal or wood, with an exhausting cylinder beneath; when the hair has been received on one of those 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."

As illustrating the history of the art, and fixing the true relations to it of subsequent discoveries, rather than as directly bearing on the case in issue, it may be mentioned that in 1842 a certain Fosket began experiments in this same branch of business, and obtained a patent January 23, 1846, three months before Wells obtained his original patent.† Fosket's machine consisted of a combination of a vibrating

* A "bat" is a hat-body in the process of formation.

† Wells's reissue, No. 1087, referred in its preamble to this patent of Fosket, reciting it as a prior patent.

bowstring disintegrating apparatus, worked by a wheel, as in figure 7; a hollow perforated revolving vacuum cone and a

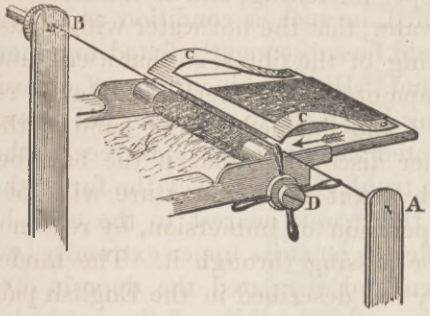


Fig. 7.

trunk or conductor, partially surrounding the disintegrater at one end, and extending to the cone, for the purpose of guiding and directing the fur between the disintegrating mechanism and the cone. The patent of Fosket was reissued March 23, 1858, two years anterior to the Wells reissues of 1860. A person named Robertson, and Hezekiah Miller, a Philadelphian, had previously made certain improvements, not necessary to be specially presented; the former in 1838, the latter in 1839.

The present controversy related to the formation of the "hat-body," or foundation of the hat on the perforated cone, and the removal of it when formed from the cone without injury to the texture; the former matter being the principal question.

A fur hat-body is required to be made of uniform thickness in the direction of its circumference, and of varying thickness from brim to tip, thin at the tip and along the crown, and thick at the band and brim; but thickest at the junction of the brim with the crown, termed the band. To secure lightness with the requisite strength calls for such a distribution of the material as will concentrate most of it where strength is most required.

Wells, from whom, as already mentioned, the complainant

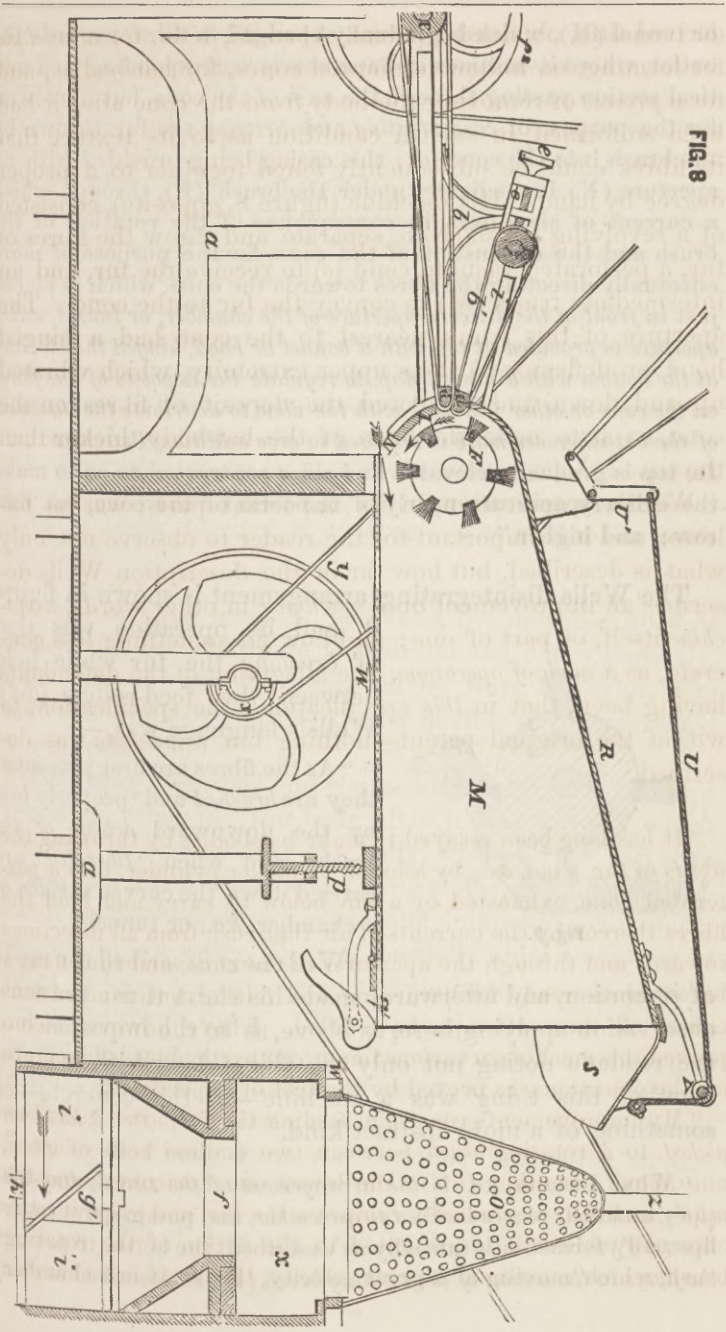
derived title, obtained a patent, April 25, 1846, for a *machine* for forming, on hollow perforated cones, fur hat-bodies, and for a *process* of removing the body from the cone after it had been so formed, in such a condition as to its texture that its fibres could be subsequently felted together to a proper degree by hand. His machine (figure 8, opposite), consisted of a revolving brush (F) to separate and throw the fibres of fur, a perforated vacuum cone (*o*) to receive the fur, and an intermediate trunk (M) to convey the fur to the cone. The aperture of this trunk nearest to the cone had a hinged hood or deflector (*s*) at its upper extremity, which vibrated up and down and regulated the deposit of fibres on the cone, so as to make the brim of the hat-body thicker than the tip.

Wells's specification, in its important parts, was as follows; and it is important for the reader to observe not only what is described, but how far in the description Wells describes an improvement on *a machine;* in other words, a *machine* itself, or part of one; and how far something less concrete, as a *mode of operation;* the allegation of the defendants having been, that in *this* specification—the specification, to wit, of the original patent—nothing but a *machine* was described.

"It has 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, but from various causes all these attempts have failed. I have, however, so improved this machine in various important particulars as to remove all the objections, as proved by the test of experiment.

"My improvements consist in feeding the fur, *after it has been picked*, to a rotating *brush*, between two endless belts of cloth, one above the other (*b b'*); the lower one horizontal, and the upper inclined, to gradually compress the fur, and gripe it more effectually where it is presented to the action of the rotating brush, which, moving at a great velocity, throws it in a chamber

Statement of the case.



or tunnel (M), which is 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, but narrower, for the purpose of *concentrating* and *directing* the fur thrown by the brush into the cone (*o*); this casing being provided with an aperture (N) immediately under the brush (F), through which a current of air enters, in consequence of the rotation of the brush and the exhaustion of the cone, for the purpose of more effectually directing the fibres towards the cone, which is placed just in *front of the delivery aperture of the chamber, or tunnel, which aperture is provided at top with a bonnet or hood, hinged thereto, and at the bottom with a hinged flap, to regulate the deposits of the fibres on the cone or other 'former,' with the view to distribute the thickness of the bat wherever more is required to give additional strength. . . .* Its top is gradually elevated and sides contracted so as to make the delivery aperture nearly of the form of the cone, but narrower and higher."

The Wells disintegrating arrangement is shown in figure 9, and its operation was that of *brushing* the fur while held between the feed-rollers (*d d'*). Wells's language was,—

Fig. 9.

"As the fibres are first presented they are *brushed* and 'properly *laid* by the downward *action of the brush*,' and when '*liberated*' are carried down the curved surface of a chamber, &c., or tunnel."

Wells next described the mode of operation, and afterwards made his claim thus: the same observation applying here, as above, as to the importance of the reader's noting not only the thing described, but also whether this thing was a machine—in the concrete—or something of a more abstract kind.

"What I claim, &c., is *the arrangement of the two feeding-belts (b b'), with their planes inclined to each other*, and passing around the lips (*d d'*) formed substantially as described, the better to present *the fibres to the action of the rotating brush* (F), as described in com-

bination with the rotating brush and tunnel or chamber (M) which *conducts* the fibres to the perforated cone or other former placed in front of *the aperture or mouth thereof*, substantially as herein described. I claim the *chamber* (M) into which the fibres are thrown by the brush, in combination with the perforated cone or other 'former' (*o*) *placed in front of the delivery aperture thereof*, for the purpose and in the manner substantially as herein described, the said chamber being provided with an aperture (N), below and back of the brush, for the admission of a current of air to aid in throwing and directing the fibres on to the cone or other former, as described. I also claim the employment of the *hinged hood* (*s*) *to regulate the distribution of the fibres on the perforated cone or other former, as described.* And I also claim providing the *lower part or delivery aperture of the tunnel or chamber with a hinged flap* (*q*), *for the purpose of regulating the delivery of the fibres to increase the thickness of the bat where more strength is required, as herein described, in combination with the hood, as herein described.*"

In the original machine of Wells, the movable hood, it seemed, did not distribute the fur on the cones perfectly, and it was subsequently improved by Burr & Taylor, who made the trunk of copper or other flexible metal, regulated by a movable top.

Wells also described and claimed in his original patent a process of removing the body after it was formed, which consisted in surrounding the body, while yet on the cone upon which it had been formed, with cloths, and then placing over it another perforated cover, and immersing the whole, together, in hot water, so as to partially unite the fibres of fur into a loose texture,—a part of the patent not important here to be dwelt upon. This original patent, as stated in the beginning of the case, was surrendered, for an alleged defective specification, and *two* reissued patents were granted; one being for *the machine*, and the other for the *process* of removing the body from the cone by immersion in hot water.

On the 10th of January, 1860, Seth Boyden—the person mentioned in the beginning of the case as the person whose

patent came into competition with the *machine* reissues (No. 1087) of Wells—obtained letters for a machine for forming hat-bodies, and the defendants used several machines under this Boyden patent. On the 3d of December, 1860, after the Boyden machine had been put in operation at the defendant's factory, where the complainant was invited to inspect, and saw it, the complainant, who now owned the reissues of 1856 of the original Wells patent, again surrendered them for a defective specification, and obtained two new reissues, to wit, the issues No. 1086 and 1087,—the former for the *process;* the latter, on which, as already said, the principal question in the present suit turned, for the machine. The reissues for both were obtained under the thirteenth section of the Patent Act of 1836, which permits a patentee to surrender a defective patent, and to have it renewed in proper form "whenever it shall be inoperative or invalid by reason of a *defective* or *insufficient* description or specification, or by reason of the patentee claiming in his specification as his own invention *more than he had a right to claim as new*, if the error has arisen by inadvertency, accident, or mistake," &c. The complainant, in his application for these reissues, stating that he was the assignee of Wells, set forth, as the ground for the application, "that the aforesaid patent is *not fully available to him as assignee;* that said error has arisen from inadvertence, accident, or mistake."

In the latter of the two reissues of 1860—that is to say, in No. 1087, the *machine* patent, and the patent on which the chief questions in this suit arose—the invention of Wells is thus described; and as the reader's attention was directed (*ante*, p. 542), in reading the specification and claim in the *original* patent, to observe how far they described or claimed *machines* in a concrete form, and how far *modes of operation* abstractly, so it must be directed to the same point in reading the description and claim in the reissue; for it was upon the different character of the claim in the two that the case largely rested.

"*The mode of operation of the said invention* of the said Henry

A. Wells is such that the fur fibres are directed and controlled so as to travel from the picking and disintegrating brush (F) towards the surface of the pervious cone or other 'former' (*o*), that they may be deposited thereon to the thickness required to make a bat of uniform thickness all around, and of the required varying thickness from brim to tip; and this *mode of operation* results from combining with a rotary picking and disintegrating brush, and a pervious cone or equivalent former, connected with an exhausting apparatus, *suitable means* for directing and controlling the fur-bearing currents.

"*The said mode of operation, invented by the said Henry A. Wells, is embodied in the following description of the mode of application*, reference being had to the accompanying drawings, in which *a* is a frame properly adapted to the operative parts of the machine, and *b* the lower feed-apron, on which the stock or fur is spread by the attendant, in separate parcels, each sufficient for the formation of a hat, according to its intended weight."

Then followed a description of the machine, as in the original patent, with these exceptions: 1. The word "hood" which occurred in the original patent is omitted, and the word "upper deflector" substituted for it. 2. The word "hinged flap" is omitted, and "lower deflector" substituted throughout. 3. A clause near the end of the original patent of 1846 is altered by leaving off the part in italics:

Passage in Original Patent of 1846.	*Corresponding Passage in Reissue of* 1860.
It will be obvious, from the foregoing, that the hood may be operated by hand instead of machinery, thus substituting the attention, skill, and cost of an operative for the positive regularity and cheapness of mechanical movements, &c.; *but such a change, whilst it gives less perfect and advantageous results, still involves one of the essential parts of my invention.*	It will be obvious, from the foregoing, that the hood may be operated by hand instead of machinery, thus substituting the attention, skill, and cost of an operative for the positive regularity and cheapness of mechanical movements.

After describing the machine as shown in the drawing, and described in the original patent, the specification resumes thus:

"Having thus described the mode of application of the said

invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, I do not wish to be understood as limiting the claim of my invention to *such* mode of application; as other modes may be devised, having the same *mode of operation*, or *principle*, and only differing from it in form, or in the substitution of *equivalent* means.

"Nor do I wish to be understood as making claim therein to the combined process of forming and hardening hat-bodies on pervious cones or other analogous 'formers,' preparatory to taking them off in a suitable condition for the after-process of sizing by felting, as this is the subject of another patent.

"What I claim *as the invention* of the said Henry A. Wells, in machinery for forming bats of fur fibres, in the manufacture of fur hat-bodies, *is the mode of operation substantially as herein described*, of forming bats of fur fibres of the required varying thickness, from brim to tip, which *mode of operation* results from the combination of the rotating picking mechanism, or the *equivalent* thereof, the pervious 'former' and its exhausting mechanism, or the *equivalent* thereof, and the *means* for directing the fur-bearing current, or the equivalent thereof, as set forth."

The Boyden machine—or rather the important and peculiar part of it—as used by the defendants, is shown in figure 10 (opposite). It consisted of a revolving *picker*, or *devil* (the instrument described, *ante*, p. 535), to separate the fibres; a perforated vacuum cone to receive the fur, and *an intermediate plate to so guide the fur as to cause more to be deposited on the base than the top of the cone.* Boyden thus described his invention; this being the invention which it was alleged by the complainant infringed the right granted by the *machine* patent, or reissue No. 1087, of Wells, whose specification and claim have just been set forth (*ante*, p. 547–8).

"This invention relates to *an improved mode of directing or guiding the fur to the cone*, as hereinafter fully shown and described, *whereby trunks and all other comparatively complicated appliances hitherto used for the purpose are dispensed with*, and *an exceedingly simple and efficient device substituted therefor.* The invention consists in placing directly in front of the picker D a plate (F), so bent or curved that its surface will have a certain

Statement of the case.

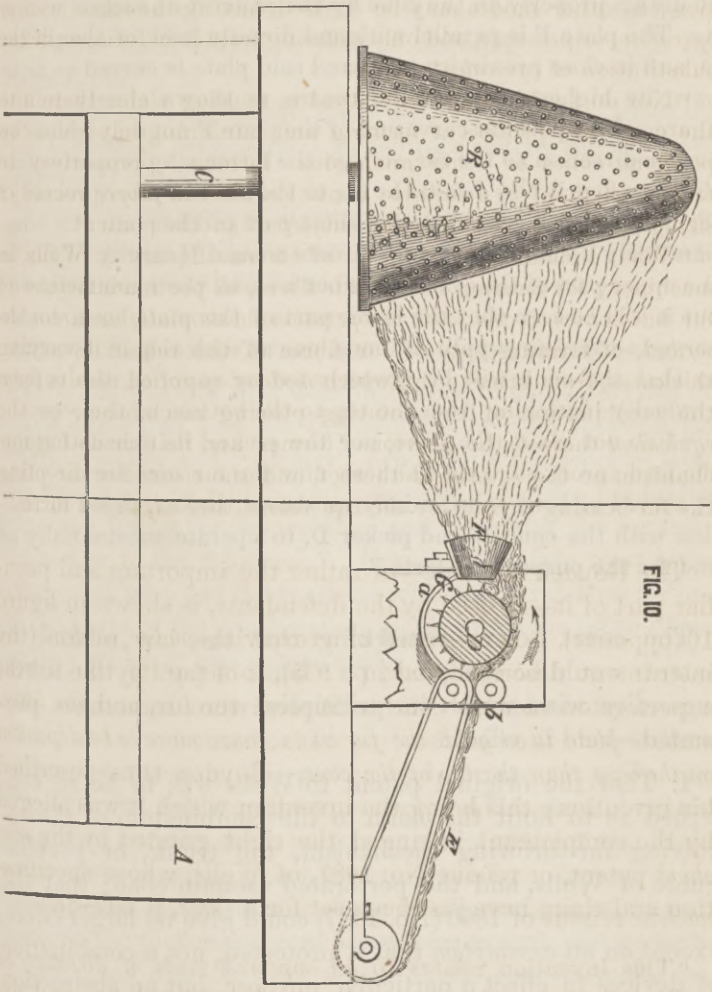


FIG. 10.

relative position with the axis of the picker and the surface of the cone (B), and give such a direction to the fur as the latter is thrown on it by the rapid motion of the picker, that the fur will be drawn properly on the cone by the exhaust or suction within it. The plate F is parallel with and directly back of the picker D, and in close proximity to it, and said plate is curved so as to have its highest point at the centre, as shown clearly in the figure. This peculiar curvature of the plate F not only gives the proper direction to the fur, so that the latter may properly *cover* the cone, but it also *directs* the fur to the cone in *proper quantity;* for instance, the central and highest part of the 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 the plate has a double curved surface to supply the cone, one at each side of its centre, so that the cone will be properly fed or supplied, the supply gradually increasing from the top to the bottom of the cone.

"I do not claim the cone, nor the picker, neither do I claim the feed-apron, but I do claim as new 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 court below—remarking that the law relating to patents would be obscured in a "bank of fog" by the subtle ingenuity with which its principles were sometimes presented—held in effect:

1. That the original patent to Wells was to be so construed as to limit the claim to the combination of the revolving fur-throwing mechanism, the trunk, or peculiar guide of Wells, and the perforated vacuum cone; that the *machine* reissue of 1860 (No. 1087) could give no larger effect, except on an *assumption* that it protected, not a combination of devices to effect a particular purpose, but an abstraction or generalization broad enough to include all combinations whatsoever of devices to produce the same effect; "a transcendental abstraction magnified into a monopoly, not of a machine (which is a concrete thing), but of a principle, effect, or result." And that if this was assumed, an assumption

was made that the patent protected that which it is no purpose of a patent to protect, and that which made it void.

2. That Boyden's machine was no infringement of the *reissued* patent of Wells; and, if it was such infringement, the *reissue* itself would be void as claiming more than the original did.

3. That as to the patent for process (reissue No. 1086) the claim wanted originality; Ponsford's patent having been prior to it.

From the consequent dismissal of the bill the appeal came; the correctness of these views on the case as stated being the principal questions here.

Messrs. Stoughton, Gifford, and Keller, for the complainant:

I. Wells was the first who introduced *any guiding and directing mechanism*, and his introduction of that between the rotating picker and "former" produced a *new machine*, viz., the first machine which could successfully make hat-bodies from the flying fur, by guiding and directing the fur from the picker to the "former." He may therefore treat as infringers all who use the machine with only a *substitute* for one of the parts of the combination, performing the office of the part for which it was substituted.

II. The machine reissue (No. 1087) should not be so construed as to be limited to the particular form of mechanism interposed between the picker and former to guide and direct the fur, but it ought to cover *any device* placed between the picker and the cone, performing the office of the Wells mechanism in guiding and directing the fur. It is not important what the particular shape or construction of the part between the picker and cone is, so long as such part *performs the office and does the work* which Wells conceived the importance of having *there* done, and which he there did, and which characterize the operation of his machine.

In *Winans* v. *Denmead*,* the majority of this court, in-

* 15 Howard, 341.

cluding three of its present justices, recognized and applied the following principles:

1. That the *mode of operation* constitutes the *essence* of a machine.

2. That the "mode of operation is, in view of the patent law, the *thing* entitled to protection."

3. That a description by the patentee of *one structure or device*, embodying his new mode of operation, is sufficient to entitle him to be protected against the use of *other structures or devices*, to carry on substantially the same mode of operation.

4. That copying the *mode of operation* described is an infringement.

5. That a patentee *may* and *should* so form his specification and claim as to cover his *new mode of operation.*

6. That where the patentee has described his invention and shown its principle, and claimed it in that form which most perfectly embodies it, he is deemed to cover by his claim *every form* embodying *his mode of operation.*

7. That to form an infringement, the defendants need not have produced the same degree of result as the patentee, but that it is sufficient to constitute infringement if the result "be the *same in kind*, and effected by the employment of his *mode of operation* in substance."

To apply this doctrine to the Wells patent, let us ask:

What is the structure or device described in the Wells patent as embodying his inventions? It consists, essentially, of a rotating picker, a pervious, exhausted, conical "former," a device intermediate to the picker and former, to guide and shape the current of fur, to present a section of it to the cone nearly in the form of a vertical section of the cone.

What mode of operation is introduced and employed by this structure or device, that is, by the Wells machines?

The answer is, that operation is upon the fur; that its peculiar treatment of the fur identifies its mode of operation; that its mode of operation must be found in the relation between it and the thing acted upon, to wit, the fur; and that the adaptation and capacity of the machine to produce

and sustain that relation constitutes its principle; that is, its *mode of operation.* Its treatment of the fur is to *disintegrate* it, *throw* it into a current of air which it produces, forming a mixed current of fur and air, and thus suspend it, propelling it toward the cone, and while on its way guiding and directing it, so that when it reaches the cone a section of the current will nearly correspond with a vertical section of the cone, and *depositing* it thence upon the cone in proper thickness for a hat-body.

"*What result* is obtained by means of this mode of operation," that is, by means of the operation of the Wells machine upon fur?

The result, which is matter of common knowledge and is proved, is, that bodies are formed with such rapidity, and of such quality, and out of such variety of stock, that the manufacture of hats has been revolutionized; that fur is now used for hats which could not before be used; that one machine forms from three hundred and fifty to four hundred hat-bodies per day, while twenty was a large day's work for a good workman by the old process of hand-bowing; that fur hats are made better and out of less material by the operation of a machine than they were by hand-bowing; that hats are greatly cheapened to the consumer by the operation of this machine; and that hand-bowing, once the most difficult part of the hatter's trade, has now ceased to be any part of it.

"*Does the specification of claim cover the described mode of operation by which the result is attained?*"

The Wells specification does directly and expressly cover the mode of operation. In *Winans* v. *Denmead* there was some doubt as to whether or not the claim was sufficient to cover the invention—that is, the mode of operation; but in this case there can be no uncertainty. In view of the opinion of the court in that and other cases holding the same doctrine, the claim of the reissued patent was made so as to expressly cover the mode of operation of the Wells machine. This claim is for "the mode of operation" resulting from the "combination" of the mechanism.

It is obvious that, where the invention is in machinery, the *mode of operation* embodied in such machinery must constitute the essence of the *means* of producing the result. If any one think otherwise, let him test it by supposing the mode of operation to be taken away from the machine, and see what will remain. To enforce this truth, imagine, if possible, a machine without any mode of operation, and what is it? Clearly nothing but the wood and metal composing it. This shows that the mode of operation is the characterizing feature.*

III. The claim of the reissued machine patent (No. 1087) is not void as being for an unpatentable subject-matter. It will be insisted on the part of the appellees, that because the claim *expressly* covers the "mode of operation" of the combination, it covers an abstraction or a result; and that such a result as is not patentable. To this two answers may suffice:

1. That the "mode of operation" of a combination in machinery is neither an abstraction nor an unpatentable result.

2. The phraseology having been recommended by this court, and adopted by the owners of the patent pursuant to such recommendation, the court will sustain it.

It will be further insisted on the part of the appellees, that because the claim specifies that the "mode of operation" claimed *results* from the combination of mechanism, therefore, the claim must cover an unpatentable result.

It is submitted that neither such reasoning nor such conclusion is sound:

1. There cannot be a mode of operation of a combination without the existence of the combination.

2. Creating or bringing into existence the combination, of course, produces the mode of operation.

* McCormick *v.* Seymour, 2 Blatchford, 246; Tatham et al. *v.* Le Roy, 1 Id., 485; O'Reilly *v.* Morse, 15 Howard, 62; McClurg *v.* Kingsland, 1 Id., 202; Curtis on Patents, § 223; Morgan *v.* Seaward, Webster's Patent Cases, 170; Haworth *v.* Hardcastle, Id., 484; Nelson *v.* Harford, Id., 295; Walton *v.* Potter, 587; Huddart *v.* Grimshaw, Id., 95; Russell *v.* Conley, Id., 463.

3. It follows, therefore, that the mode of operation of a combination of parts in machinery *does result* from that combination.

The mode of operation is a property of the combination and cannot exist without it. The phrase, "the mode of operation of a combination," has the same meaning as the phrase, the mode of operation resulting from the combination.

As to infringement: The defendants infringe by using the combination patented, varied only by the substitution of a mechanical equivalent for one of the elements of the combination. The question respecting infringement is not whether the defendant's machine is like the patentee's or is different from the patentee's, because it may be greatly different, and the differences may also be patentable and patented; but the question is, whether or not the defendant's machine contains the invention of the patentee.* The fact that an alteration in a machine is patentable and patented as an improvement, does not prevent its being a mechanical equivalent, and the use of the machine an infringement.†

As to the reissued patent: The *original* patent of Wells sets forth the invention which is claimed in the machine reissue (No. 1087), and justifies and sustains that reissue.

The specification of that original patent consists of five divisions:

1. A statement of what was needed.

2. A statement that he (Wells) had succeeded in accomplishing what others had tried in vain to do.

3. A general statement of the means by which he had succeeded.

4. A description of such means and its mode of operation; and,

5. A specification of items claimed.

Both a machine for forming the bats (or fabric of the body), and the process of removing them from the "former,"

* Curtis on Patents, 2d ed., § 224.

† McCormick *v.* Talcott, 20 Howard, 405; Crehoe & Brooks *v.* Norton. *Coram* Nelson, J., Southern District of New York, A. D. 1853.

are described in this original specification. The machine consists of three classes of mechanism. One to receive, disintegrate, and throw the fur; another to act upon, guide, and direct the fur; and the other to receive and hold the fur. A *trunk* was the means which he adopted to put in operation that idea; and it is acknowledged that that was the best form of means which has yet ever been known for such purpose. In his original specification he says, that this trunk "is gradually changed in form toward the outlet, where it assumes a shape nearly corresponding to a vertical section passing through the axis of the cone, but narrower." After giving this direction he states the object, and says it is "for the purpose of concentrating and directing the fur." Again, in this specification, he says, in describing the trunk: "Its top is gradually elevated, and sides contracted, to make the delivery aperture nearly of the form of a cone, but narrower and higher."

By this original patent three things are claimed in combination, irrespective of other parts:

1. The trunk or chamber.
2. The perforated cone or "former."
3. The picker or brush.

This shows that he regarded this combination of leading and essential parts as constituting the *substance* and *essence* of his invention of the machinery; and it is submitted that *any* reissue from this patent covering the *mode of operation* of *this* combination is sustained by the original, and is good and valid against the use of *any equivalent* of any of these three parts.

A combination of the *trunk*, "*former*" *and picker* being claimed in the original patent of Wells, irrespective of other parts, was, perhaps, sufficient to cover the "mode of operation" of that combination, and the use of any "equivalents" for either of those parts. But after the direction given by this court in *Winans* v. *Denmead*, it became not only prudent and proper for the owners of the patent, but their duty, to have it so reissued as to expressly cover the mode of operation of the combination. It was pursuant to the directions

of this court in the case just named that the reissued machine patent was obtained.

A patent may be valid and may have been so held to be by a court, without being broad enough to cover the whole invention. In such cases the act of Congress tenders the patentee relief by reissuing to make his claim broader.* It is no objection to a patent that it has been more than once reissued.† If the last reissued patent claimed under be adapted to the invention made by the patentee, and described in his original patent, it is valid as a reissue, and it is immaterial how many prior reissues there may have been, or what may have been the proceedings or mistakes in applications for or in the granting of such prior reissues.‡

The action of the Commissioner of Patents in accepting a surrender of a patent and granting a reissue, is conclusive that the prerequisites to the surrender did exist, unless fraud be shown.§

4. As to the reissued patent No. 1086,—the process patent. Ponsford's patent, it is true, did exhibit a process of removing the body from the cone on which it had been formed, similar to the process of Wells. But the invention was defective in not presenting or forming the body prior to its removal. It was, therefore, an incomplete invention and substantially different.

Messrs. George Harding and Courtland Parker, for defendants:

As to the originality of Wells's machine patent.

In view of the prior inventions of Williams, the extent of Wells's invention in the machine patent (No. 1087) may be thus analyzed:

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* Batten *v.* Taggart, 17 Howard, 83.

† O'Reilly *v.* Morse, 15 Id., 112.

‡ Goodyear *v.* Day, 2 Wallace, Jr., 283; Woodworth *v.* Stone, 3 Story, 749, 753; Allen *v.* Blunt, 3 Id., 742–3; Carver *v.* Braintree Manufacturing Co., 2 Id., 432–8.

§ Stimson *v.* The Westchester R. R. Co., 4 Howard, 380, 404; Same *v.* The Philadelphia and Trenton R. R. Co., 14 Peters, 448.

I. In the machine patent, Wells substituted as a disintegrating agent for the carding machine, shown in figure 6, page 538, the revolving brush, shown in figure 9, page 544.

II. Wells adopted from Williams's machine the following:

1. The hollow perforated removable formers, as shown in figures 11 and 12, resting on horizontal wheels:

Fig. 11.

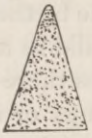


Fig. 12.

2. Two revolving perforated removable wheels, having rims projecting below to turn on, and secure the joint, and cogs on their circumference to be driven by; as shown in figure 13.

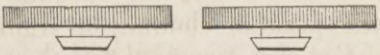


Fig. 13.

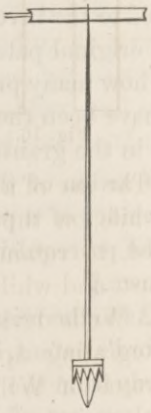


Fig. 14.

3. A central pinion, or an upright shaft, for driving these wheels. (See figure 14.)

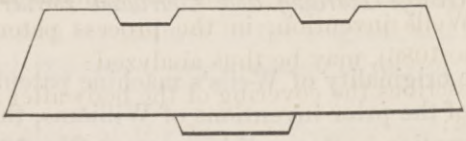


Fig. 15.

4. A cone-box capable of revolving, connected by a rim with a lower box or conduit leading to the exhaust-box (as shown in figure 15), having two sockets above for the cone-wheels.

5. A conduit from the cone-box to the fan-box, with a socket above for the cone-box to revolve in, as in figure 16.

6. A fan-box and fan with side passages for entrance of air, as in figure 17.

Fig. 16.

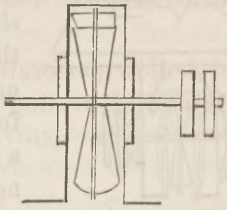


Fig. 17.

7. The use of a hollow perforated cover, to place over the fur while on the former, after the material had been deposited, to retain it in position when removed from the exhaust, and while subsequently treated.

III. Wells devised and introduced between his peculiar disintegrating apparatus or brush and the vacuum cone apparatus of Williams, the peculiar conduit, or trunk, or tunnel, as it is called, with its hood and its flap, shown in figure 20, page 560, and thus produced the complete machine shown in figure 8, *ante*, p. 543.

As to the originality of the process patent of Wells.

In view of the prior inventions of Williams and of Ponsford, the Wells invention, in the process patent of Wells (reissue No. 1086), may be thus analyzed:

Wells describes the covering of the body after it is formed on the cone:

First, with a cloth, which was the invention of Ponsford.

Second, with a perforated metallic conical case, which was the invention of Ponsford and Williams.

Third, the immersion of the whole in a vessel of boiling-hot water, which was the invention of Ponsford.

It is, therefore, only necessary to say, that in view of Ponsford's English patent, Wells's reissue, No. 1086, claiming exactly the same invention, should be declared to be void.

As to Boyden's machine: Williams, Wells, and Boyden all used the Williams' vacuum cone apparatus, see fig. 18. Williams having employed a carding machine and fan, F, as shown in fig. 19, to disintegrate and throw the fur on to the cones; Wells, on the one hand, substituted therefor a revolving brush, F, inclosed in a tunnel or trunk, M, with a vibrating nood or cap, *s*, as shown in figure 20.

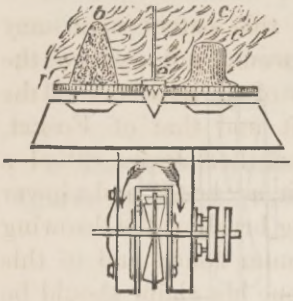
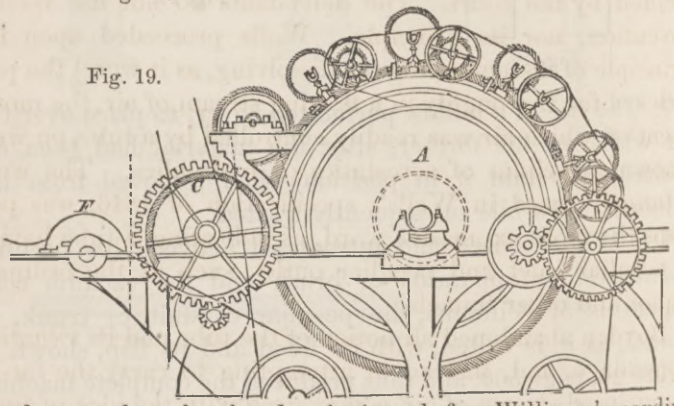


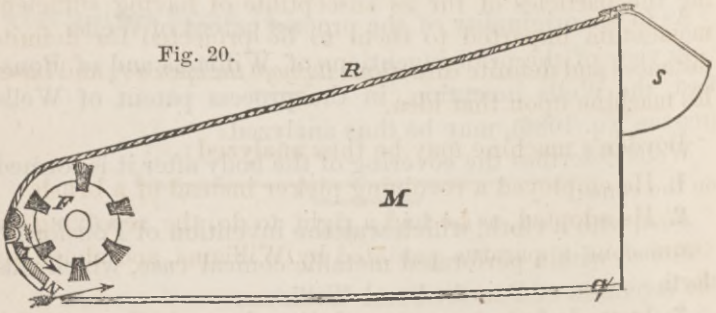
Fig. 18.

Fig. 19.



Boyden, on the other hand, substituted for Williams' carding machine and fan an open picker, D, with a curved guide plate, F, in front of it, as shown in figure 21.

Fig. 20.



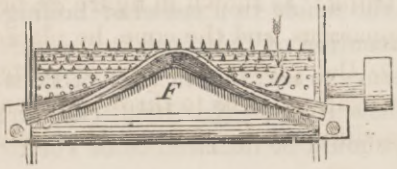


Fig. 21.

As to the infringement of the machine patent:

The defendants do not infringe this patent upon any construction of its claims which would not require the patent to be declared void. In view of the new state of the art, as shown by Williams's patent and that of Fosket, Wells invented nothing but the peculiar device called a "trunk," with two appendages, to wit, a "hood" and a lower "flap" placed between the revolving brush or fur-throwing mechanism and the perforated vacuum cone; and to this combination of brush, trunk and cone his claim should be limited by the court. The defendants do not use Wells's invention, nor its principle. Wells proceeded upon the principle of disseminating (or dissolving, as it were) the particles of fur thoroughly in a flowing stream of air, the movement of which air was readily controlled by a tube, on well-known principles of aerostatics or hydraulics. The word "tunnel," used in Wells's specification of 1846, was perhaps the most expressive word, as indicating a tube having a peculiar inlet and peculiar outlet, such as the ordinary liquor and other tunnels.

Boyden abandoned all notion of the tube and its vibrating appendage, and, instead of attempting to carry the fur by an inclosed stream of air, commenced with the idea of treating the particles of fur as susceptible of having sufficient momentum imparted to them to be projected for definite distances and definite directions *through the open air*, and bases his machine upon that idea.

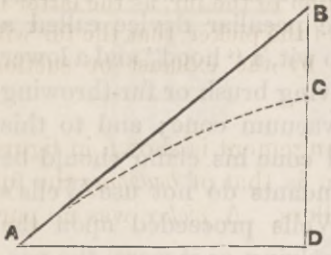
Boyden's machine may be thus analyzed:

1. He employed a revolving picker instead of a brush.

2. He adopted, as he had a right to do, the revolving vacuum cone apparatus patented by Williams, and above set forth.

3. Instead of placing a "trunk," as shown in figure 20, between the disintegrating apparatus and the cone, he placed in front of and opposite to the picker a series of plates having different angles of elevation, so as to throw different portions of fibres of fur to different heights on the cone.

Experience soon showed him that it could be so reduced to a system that the fur could, by a proper combination of inclined planes, of varied surface and inclination to the picker, be made to deposit itself in any manner desired.



In fixing the angles of the planes there must be a reference had to the influence which gravity exerts on all projectile bodies. Thus, if a body be projected from A in the direction of the line A B, instead of pursuing the course of the line A B, gravity will cause it to constantly fall from it, and to travel in the path indicated by the dotted line A C. Allowance is always made for this in gunnery, and a similar allowance has to be made for the influence of gravity in adjusting the Boyden planes.

The width of the planes is determined by the relative amount of fur that is required at the part of the cone intersected by each plane respectively. Thus the zone, at the base of the cone, one inch wide, as compared with a zone one inch wide at the top, would require very different amounts of fur; first, because of the much greater area of depositing surface presented at the base of the cone; and, second, because of the greater depth of deposit required at the base. Hence, the width of the plane which points towards the base of the cone is very many times wider than that which points towards the top.

As the one set of planes, when adjusted for a particular cone, will answer for any number of bodies to be formed on that cone, the machine is automatic, requiring only new planes when the cone is changed. The invention is thus described in Boyden's patent:

"This invention relates to *an improved mode of directing or guiding the fur to the cone*, as hereinafter fully shown and described, *whereby trunks and all other comparatively complicated*

appliances hitherto used for the purpose are dispensed with, and *an exceedingly simple and efficient device substituted therefor.*

"The invention consists in placing directly in front of the *picker* a plate, so bent or curved that its surface will have a certain relative position with the axis of the picker and the surface of the cone, and give such a direction to the fur, as the latter is thrown on it by the rapid motion of the picker, that the fur will be drawn properly on the cone by the exhaust or suction within it."

The Wells disintegrating arrangement is shown in figure 9 (*ante*, p. 544), and its operation is that of *brushing* the fur while held between the feed-rollers. A *picker* was no part of his device.

II. Subject to what the court may decide on what precedes, we contend that the claim of the Wells reissued patent is void, as being for a function, principle, or result; that the term "mode of operation" was used in the claim and throughout the Wells reissued specification, No. 1087—the machine patent—to characterize the function or result produced by the machinery, and not the manner or mode in which the physical parts comprising the Wells machine are combined and co-operate to produce that result.

In the reissue—No. 1087—obtained with a view to stop the Boyden machine, after a full inspection of it, the invention of Wells is thus described:

"*The mode of operation* of the said invention of the said Henry A. Wells is such that the fur fibres are directed and controlled so as to travel from the picking and disintegrating brush towards the surface of the pervious cone or other former, that they may be deposited thereon to the thickness required to make a bat of uniform thickness all around, and of the required varying thickness from brim to tip, and this mode of operation results from combining with a rotary picking and disintegrating brush, and a pervious cone or equivalent former, connected with an exhausting apparatus, *suitable* means for directing and controlling the fur-bearing currents.

"*The said mode of operation*, invented by the said Henry A. Wells, is embodied in the following description of the mode of

application, reference being had to the accompanying drawings."

Then follows a description of the machine as in the original patent, with these exceptions: 1. The word "hood" which occurred in the original patent is omitted, and the word "upper deflector" substituted for it. 2. The word "hinged flap" is omitted, and "lower deflector" substituted throughout. 3. A clause near the end of the original patent of 1846 is altered obviously with the intention of changing an important feature of his invention. See *ante*, p. 547, in the statement of the case, to which the reader can turn.

After describing the machine as shown in the drawing, and described in the original patent, the specification of No. 1087 resumes thus:

"Having thus described the mode of application of the said invention of the said Henry A. Wells, as the same was successfully reduced to practice by him, I do not wish to be understood as limiting the claim of my invention to *such* mode of application; as *other* modes may be devised having the same *mode of operation, or principle,* and only differing from it in form, or in the substitution of *equivalent* means.

"Nor do I wish to be understood as making claim therein to the combined process of forming and hardening hat-bodies on pervious cones or other analogous formers, preparatory to taking them off in a suitable condition for the after-process of sizing by felting, as this is the subject of another patent.

"1. What I claim as the invention of the said Henry A. Wells, in machinery for forming bats of fur fibres, in the manufacture of fur hat-bodies, is the *mode of operation substantially as herein described,* of forming bats of fur fibres of the required varying thickness from brim to tip, which *mode of operation* results from the combination of the rotating picking mechanism, or the *equivalent* thereof, the pervious former and its exhausting mechanism, or the *equivalent* thereof, and the means for directing the fur-bearing current, or the *equivalent* thereof, as set forth."

A striking feature about this claim, and indeed about the whole reissued specification, is that while professing boldly

to describe and claim a mode of operation, it neither describes what that mode of operation is, nor does it state in what parts, or combination of parts, of machinery that mode of operation is to be found.

Thus, in the first clause of the former of the passages above quoted, if the question be asked, What is the mode of operation which Wells invented? the answer would be "*such*," that the fur fibres are so directed and controlled so as to form a bat of proper thickness.

The recital of Wells's invention, in the preamble, is equivalent precisely to this: "The mode of operation of the said invention of Wells is '*such*' that the fur fibres are directed and controlled so as to form a bat, thicker at the brim than tip, and '*it results*' from combining with a revolving brush and cone '*suitable means*,' *i. e. anything* that will suit for accomplishing this result;" or, in other words, Wells's invention extends to the use of anything in connection with a revolving picker and cone which will "*suit*," and the first claim is in terms coextensive therewith, and the patent must be held to be void, unless the claim be so construed as to be limited to the substantial devices shown in the body of the patent.

Where an improvement is made upon a machine, the patentee can only claim the part, or combination of parts, which he has invented. It is otherwise where the invention is a process, strictly so speaking, in which the treatment of substances is entirely independent of the mechanical appliances.* In *Nielson* v. *Harford*,—the Neilson Hot Blast case,—the invention consisted not in a machine, but in the discovery of a process; so in Goodyear's invention. This distinction was pointed out by TANEY, C. J., in *Morse* v. *O'Reilly*.†

III. Subject to the two former points, we contend that the reissued machine patent is void. Because,

1. It is for a different invention from that set forth in the original patent as Wells's invention.

* Corning *v.* Bowden, 15 Howard, 252.

† Id., 62; and see Nielson *v.* Harford, 1 Webster's Patent Cases, 295.

2. The original patent was not surrendered because the description or claims were "insufficient," or inoperative through accident or mistake; but because, in the language of the oath filed with the application for reissue, it was "not fully available to A. Burr as assignee." The act of Congress does not authorize a surrender and reissue upon any such ground.

But these two grounds are not pressed, except in the event of the court declaring that the defendant's machine infringes upon that patent.

Mr. Justice GRIER delivered the opinion of the court.

The great question of the case is, whether the Boyden machine infringes the patent originally granted to Wells for his invention; and if not, whether his assignees, by the use or abuse of the right to surrender and reissue their patent, can so expand it as to cover by *ex post facto* operation, all subsequent inventions.

The original patent to Wells purports to be for "a new and useful improvement in the machine for making hat-bodies." His specification recites that "it had long been essayed to make hat-bodies by throwing the fibres of wool, &c., by a brush or picker on a perforated cone exhausted by a fan below, to carry and hold the fibres thereon; that all these contrivances were defective." He alleges that he has improved this machine so as to remove all the objections, as proved by the test of experiment. "My improvement," he says, "consists in feeding the fur between two endless belts, &c., which present it to the action of a rotating brush, which moving at a great velocity throws it in a chamber or tunnel, which is gradually changed in form towards the outlet, where it assumes the shape nearly corresponding to a vertical section passing through the axis of the cone, this casing being provided with an aperture, immediately under the brush, through which a current of air enters," &c. The aperture of the chamber or tunnel is provided with a bonnet or hood hinged thereto, and at the bottom with a hinged flap.

Beside the *machine* thus described, he includes a claim

also for a *process* which consists in covering the bat before it is removed with felted fulled cloth, &c. As our present concern is with the machine, we need not describe the process more particularly.

The patentee very properly does not claim to have first invented the art of making hats on exhausted cones, but to have improved the machinery or devices used for this purpose, in important particulars. After properly describing the several devices, the combination of which compose his improved machine, he limits his claim in exact conformity with such description. He says: "What I claim as my invention, and desire to secure by letters patent, in the machinery above described, is the arrangement of the two feeding-belts with their planes inclined, &c., substantially as described, in combination with the rotating brush and tunnel placed in front of the aperture or mouth thereof, substantially as described. I claim the chamber into which the fibres are thrown by the brush in combination with the perforated cone, &c. I also claim the employment of the hinged hood and providing the lower flap, for the purpose of regulating the delivery to increase the thickness of the bat, in combination with the hood."

This patent was first surrendered in September, 1856, by the assignee, and separate patents taken for the machine and the process: the same operation of surrender and reissue was repeated in 1860. The specification of the machine patent of 1860 (No. 1087) describes the machine much as before, premising that, in 1846, William Fosket had obtained a patent for a machine in which the fibres to be formed into a hat-body are drawn by suction through a tube into the lower part of a chamber surrounding a pervious cone, the inside of which is connected with an exhausting fan; but that hat-bodies are required to be made thick at or near the brim, and thin along the crown, that the required strength may be given without making the hat too heavy. The specification thus continues: "*The said mode of operation invented by said Henry A. Wells is embodied in the following description*," &c., and the claim is modified to suit this abstraction. "What is

claimed herein as the invention of said Wells is forming bats of fur fibres by throwing the fur in properly regulated quantities, *substantially as herein described.*"

Here we have the first experiment in the art of expansion by an equivocal claim, which may be construed a claim for the result or product of the machine, or for its principle or mode of operation. By this construction another inventor may be frightened from the course. But when challenged in a court of justice as too broad, the words, "*substantially as herein described*," may be resorted to as qualifying this claim of a function, result, or principle, and arguing that as the specification described a machine, it meant nothing more.

Let us consider what was the original invention of Wells, as described and claimed by himself, without regard to this ingenious attempt by the assignee to expand it into an abstraction.

It is not within the category of those inventions which consist in a new application of certain natural forces to produce a certain result to which they had never before been applied, and which, when once pointed out, required no invention to construct devices for its application. Such inventions partake of the nature of discoveries, either found out by experiment or the result of a happy thought, which, when once expressed, is plain to all intelligent persons, who could point out at once many devices for making it effectual. Any one can perceive the difference of such a case from the invention of a labor-saving machine, which is a mere combination of certain mechanical devices to produce a desired manufacture in a cheaper or better manner. The case of *McLurg* v. *Kingsland** will serve to elucidate this peculiar sort of inventions.

A workman in a foundry observed, in pumping water into a bucket, that the water entering at a tangent to the circle of the bucket, acquired a circular motion, diminishing when it approached the centre, where bits of straw and other lighter

* 1 Howard, 202.

materials would be concentrated. In casting iron rolls, the metal required to have this rotary motion for the same purpose. This effect had previously been produced by stirring the liquid metal. The thought all at once struck the mind of this observer, that the application of this principle or law of nature might be beneficially made to the casting of rolls by merely introducing the metal at the bottom of the mould at a tangent. The thought being once suggested, it required no skill or invention to devise a plan for the application of the principle. This, though classed as an invention, partook more of the nature of a discovery. In that case the court say, "We find the invention consists solely in the angular direction given to the tube through which the metal is conducted into the cylinder in which the roll is cast. Every part of the machinery is old; the roll itself is no part of the invention." And yet, it was a patentable invention or discovery, though it came not within the description of the statute, as "a machine, manufacture, or composition of matter."

It is plain that the invention of Wells had nothing of the nature of a discovery, or the new application of some power of nature to the perfection of an art or the operation of a machine, such as the application of the electro-galvanic fluid to the art of telegraphic writing. It was simply a concrete machine, an improvement on other known machines, and nothing more. Wells was not the first who discovered that bats of fur could be made on perforated cones by means of a vacuum or exhausted chamber. The patent to Williams, in 1833, was the first great step towards applying these natural forces to labor-saving machinery in the art of hat-making. He was the first to use the power of atmospheric pressure to deposit fur or fibrous materials on any surface. He used a carding machine to disintegrate the fur or fibres; a revolving fan to throw them on the cones; the hollow perforated cones or formers connected with devices for exhausting them; and the use of a hollow perforated cone to place over the bat, to retain it in position when removed from the exhaust. His drawing exhibited, as a substitute for a trunk

or conductor, a roof without side or bottom, in the shape of a pliable deflector.

Without particularly noticing the patent of Robertson, in 1838, or of Hezekiah Miller, in 1839, we may mention that of Fosket. It is dated in January, 1846. He used a bow-string moved by machinery, in place of the rotating picker used by others. He used what he describes as "a suitable passage or tube which leads from the vicinity to what may be termed the forming or wind chamber." We refer to these previous inventions, not to show that Wells's improvement was not new or useful, but to show the state of the art, in order to properly appreciate the nature and extent of the invention of Wells.

The patent act grants a monopoly "to any one who may have discovered or invented any new and useful art, machine, manufacture, or composition of matter."

That the invention of Wells comes within the category of a "*machine*," cannot be disputed. The law requires that the specification "should set forth the principle and the several modes in which he has contemplated the application of that principle, or character by which it may be distinguished from other inventions, and shall particularly point out the part, improvement, or combination which he claims as his own invention or discovery." We find here no authority to grant a patent for a "principle" or a "mode of operation," or an *idea*, or any other abstraction. A machine is a concrete thing, consisting of parts, or of certain devices and combination of devices. The principle of a machine is properly defined to be "its mode of operation," or that peculiar combination of devices which distinguish it from other machines. A machine is not a principle or an idea. The use of ill-defined abstract phraseology is the frequent source of error. It requires no great ingenuity to mystify a subject by the use of abstract terms of indefinite or equivocal meaning. Because the law requires a patentee to explain the mode of operation of his peculiar machine, which distinguishes it from others, it does not authorize a patent for a "mode of operation as exhibited in a machine." Much less

can any inference be drawn from the statute, that an inventor who has made an improvement in a machine, and thus effects the desired result in a better or cheaper manner than before, can include all previous inventions, and have a claim to the whole art, discovery, or machine which he has improved. All others have an equal right to make improved machines, provided they do not embody the same, or substantially the same devices, or combination of devices, which constitute the peculiar characteristic of the previous invention.

The original patent of Wells has been more than once decided by the courts to be a valid patent. The specification states clearly and correctly what the invention is; what the patentee claims as his peculiar improvement on former machines; what are the devices, or peculiar combination of them, which make it to differ, and the mode in which they operate to produce the required result. He claims all he had a right to claim as new, and no more. There is no error from "inadvertences, accident, or mistake."

The aim and object of both Wells and Boyden was to construct an automatic machine which would distribute the fur on the cones so that the bat might be thicker on certain portions than on others. This was the defect of former machines, which each proposed to remedy. Fosket, though he used a spout or tunnel, so constructed it that the crown of the hat was thicker where it ought to have been thinner.

The great and peculiar characteristic of the Wells invention is a tunnel or chamber, constructed as described. Instead of the picker, he used a rotating brush to distribute the fur from the feed-aprons, and throw it forward into the chamber which conducted it to the cones. The hinged hood and flap were devices to distribute the material in unequal quantities, to accomplish the object of making the bat thicker in one part than another. This machine, although an improvement on its predecessors, was not automatic, although it professed to be such. It would not distribute the fur in proper proportions without the assistance of a skilful operator. But, finally, Messrs. Burr & Taylor, after much expense and labor, devised the plan of making this

chamber or trunk of thin sheet metal, regulated by a movable top, so that the deposit of the fibres could be regulated by adapting the form of the delivery aperture to any size required.

Now, 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. These abstract phrases, "*substantial* identity," "equivalent," "mode of operation," &c., are 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. 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 its devices which suggests the peculiar device employed by Boyden. His machine has no tunnel, no cap, no flap, nor any equivalent therefor, nor does it incorporate in its structure the substance of the first invention. There is nothing to be found in the specification of Wells which would ever suggest the peculiar device of the Boyden machine. As an improvement, it has more claim to originality than that of Wells. It is thus correctly described: "This invention relates to an improved mode of directing and guiding the fur, as hereinafter fully shown and described, whereby trunks and all other comparatively complicated appliances hitherto used for the purpose are dispensed with, and an exceedingly simple and efficient device substituted therefor. The invention consists in placing directly in front of the picker a plate so bent or curved that its surface will have a certain relative position with the axes of the picker and the surface of the cone, and give such a direction to the fur, as the latter is thrown on it by the rapid motion of the picker, that the fur will be drawn properly on the cone by the exhaust or suction within it."

Now, "an infringement involves substantial identity, whether that identity be described by the terms, 'same

principle,' same '*modus operandi*,' or any other. It is a copy of the thing described in the specification of the patentee, either without variation, or with such variations as are consistent with its being in substance the same thing. If the invention of the patentee be a machine, it will be infringed by a machine which incorporates in its structure and operation the substance of the invention; that is, by an arrangement of mechanism which performs the same service or produces the same effect in the same way, or substantially the same way."*

No one who reads the two specifications, or inspects the two machines, can aver that they contain the same combination of mechanical devices, or substantially the same, to produce the desired effect. Not one of the devices, or its equivalent, used in the one is to be found in the other, nor is its mode of operation the same. The argument used to show infringement assumes that every combination of devices in a machine which is used to produce the same effect, is necessarily an equivalent for any other combination used for the same purpose. This is a flagrant abuse of the term "equivalent." Without attempting to define this abstract term by other abstract terms, we may give examples which will best show its application to machines, as, where a simple lever is used in one, and the other substitutes a cam, or toggle-joint, or wedge for a cam, and many other cases where one mechanical power is substituted for another in a machine. In the case of *McCormick* v. *Talbot*,† we have said: "If the invention claimed be itself but an improvement on a known machine by a mere change of form or combination of parts, the patentee cannot treat another as an infringer who has improved the original machine by use of a different form, or combination performing the same functions. The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress all other improvements which are not colorable invasions of the first."

But it has been argued, that though not a colorable *in*vasion of the patentee's claim, it is an *e*vasion of his patent,

* Curtis on Patents, 322.

† 20 Howard, 405.

which is equally injurious. If so, it is "*damnum absque injuria.*" 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.

Now we are of opinion that the invention of Wells was a machine which was an improvement on the machines previously known. It is not founded on any new discovery of the application of any element or power of nature to produce an effect. He was not the first to devise the application of a vacuum to cones for the purpose of forming and compressing bats for hat-bodies, nor the first to discover that such bats should be made of unequal thickness, nor of pickers to distribute the fur from the carding apparatus. He has improved this machinery by his peculiar devices of brush, trunk, cap, flap, &c., combined in a machine which failed to be automatic till further improved. We are of opinion, also, that the specification of Wells correctly set forth the peculiar combination of devices in the machine he invented, that, as required by the statute, he truly and correctly stated the principle or mode of operation of his machine, and the functions performed by its several devices. There was no mistake in his specification by inadvertency or accident. He had a valid patent claiming his whole invention,—no more, no less.

But as the respondents are charged in the bill with infringement of a reissued patent, dated 3d December, 1860, and since the patent granted to Boyden, we must give it more special attention. It is true, we might dispose of it by saying, that as the machine of Boyden is not an infringement of the original invention of Wells, it cannot infringe the reissued patent if it be for the same invention, and if the reissued patent be not for the same invention, it is void.

Without affirming or denying the charge of respondents, that this reissued patent is fraudulent as well as void, it will be proper more particularly to notice its history and contents.

The patent to Boyden was issued on the 10th of January, 1860. The complainants were invited to examine it. They

did so, accompanied by their counsel and other experts. After this, the complainants surrendered their valid patent, or rather its reissue of 1856, and have another reissue, which is now contended to have been made so elastic or expanded that it may be used to suppress all other inventions which have been or may be made to effect the same purpose. The application for this reissue, as sworn to by one of the assignees, contains the following suggestion: "That the aforesaid patent *is not fully available to him, as assignee;* that said error has arisen from inadvertence, accident, or mistake," &c.

Previous to the Patent Act of 1836, which established a board or bureau composed of competent examiners, patents had frequently been adjudged invalid from the insufficiency of the specification; usually because, by inadvertency, accident, or mistake, the patentee had not sufficiently separated the old from the new, and had claimed more than he was entitled to. Few inventors, or even learned lawyers, were capable of correctly and clearly setting forth in a specification the proper limits of the just claim of the invention. The thirteenth section was intended to remedy this evil, by permitting the patentee to surrender his defective patent, and have it renewed in proper form, "*whenever it shall be inoperative or invalid, by reason of a defective or insufficient description or specification*, or by reason of the patentee claiming in his specification as his own invention more than he had a right to claim as new, if the error has arisen by inadvertency, accident, or mistake," &c.

Since the date of this act, not only the Patent Office but the bar can furnish gentlemen fully competent to the task of drawing up proper specifications, and but little liable to commit blunders from inadvertency. Specifications now seldom issue from the Patent Office to which such an imputation can be made. Nevertheless, this privilege of surrender and reissue is resorted to more frequently than ever. Formerly, when in course of investigation in a court of justice it was discovered that a patent was invalid for any of the reasons mentioned in the act, it was resorted to for protection. *Now*, after a patent has been declared to be valid, the specification

without defect, and the claim for nothing more than the invention, after it has undergone examination for many years, and courts and juries have decided that the patent is *not* invalid, through inadvertency, accident, or mistake, the assignees come forward and make oath, that the inventor's original patent is "unavailable" for some purpose unnecessary to be divulged. In the present case the purpose is transparent. The specification of this reissued patent, instead of describing first the machine and the several devices which exhibit its peculiar mode of operation in order to produce the desired effect, and stating what the patentee claims as his peculiar invention, commences by describing "*a mode of operation*" as the thing intended to be patented, and uses these words: "The said *mode of operation*, invented by the said Henry A. Wells, is embodied in the following description of the mode of application." The claim is for the "mode of operation, substantially as herein described."

We have no leisure for a further development of this novel form of patent, or how, by the use of general and abstract terms, the specification is made so elastic that it may be construed to claim only the machine, or so expanded as to include all previous or future inventions for the same purpose.

Morse was certainly the first who successfully applied the element of electro-magnetism to telegraphing. By the eighth claim of his reissued patent he claimed "not the specific machine described, but the use of the motive power of the galvanic current however developed for printing signs or letters at a distance, being a new application of that power of which he was the first discoverer."

On which this court remark,* "It is impossible to misunderstand the extent of this claim, if it be maintained, it matters not by what process or machinery the result is accomplished. Another may possibly discover a mode of writing or printing at a distance by means of the electric or galvanic current, without using any part of the process or combination set forth in plaintiff's specification. Yet if it is covered

* O'Reilly *v.* Morse, 15 Howard, 112.

by this patent the inventor could not use it, nor the public have the benefit of it, &c. The court is of opinion it is too broad and not warranted by law."

In this case we have an attempt to convert an improved machine into an abstraction, a principle or mode of operation, or a still more vague and indefinite entity often resorted to in argument, an "*idea.*" Those who use the latter term seem to have no fixed *idea* of what they mean by it. But it may be used as successfully to mystify a plain matter as the words used in the specification.

The Patent Bureau in this country is composed of men of scientific attainments, who examine the merits of every claimant of a patent, and decide whether in their opinion it attempts to claim a monopoly of things before known or invented. They are not expected, as formerly, to grant a patent without inquiring, to every applicant who is ready to pay the fees. Such a course of conduct would be highly injurious to the public, by furnishing means to impose on the public by false pretences, and with threats of expensive and ruinous litigation.

The surrender of valid patents, and the granting of reissued patents thereon, with expanded or equivocal claims, where the original was clearly neither "inoperative nor invalid," and whose specification is neither "defective or insufficient," is a great abuse of the privilege granted by the statute, and productive of great injury to the public. This privilege was not given to the patentee or his assignee in order that the patent may be rendered more elastic or expansive, and therefore more "*available*" for the suppression of all other inventions.

We concur, therefore, in the decision of the Circuit Court, that the machine of Boyden is not an infringement of the invention of Wells; and if it be an infringement of the reissued patent, that patent is void.

2. The bill claims, also, for an infringement of Wells's reissued patent for his process. This has not been much insisted on. 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 decide accordingly.

DECREE AFFIRMED WITH COSTS.

NOTE.

At the same time with the preceding cases, or rather immediately afterwards, two other cases, appeals from the New Jersey district, between the same parties and relating to the same general subject of hat-bodies, were heard; the same counsel who had argued the first and principal case, arguing these two also; though not at length, as from the fact already mentioned, to wit, that the principles involved were the same, it was understood that the decision of these two would follow the decision of the first and principal case. The first of these two cases decided simply a point of fact, to wit, that the machine known as the "Boyden machine," and so largely discussed in the principal case, was not an infringement of a patent granted in the same department of manufacture to a certain Hopkins: no reasons being assigned; GRIER, J., who delivered the opinion of the court, remarking that, while their honors had come to a conclusion satisfactory to their own minds, it was impracticable to "vindicate" it without the use of the "large museum of exhibits in the shape of machines and models" which had been presented on the argument of all these three cases, and which "were absolutely necessary to give the court a proper understanding of the merits of the controversy." The result, therefore, was stated; the curious being referred for reasons to those given by the defendant's witness, Mr. Tredwell, examined in the case. This decree, too, was affirmed with costs.

The other of the two cases admits of a certain kind of report, now given, as on the three pages which follow.

Statement of the case.

SAME *v.* SAME.

No. 231.

The "Boyden machine" does not infringe the patent of A. B. Taylor. The practice of reissuing patents for the purpose of interpolating abstract generalizations, so as to cover subsequent inventions made by others, is condemned.

BILL in chancery, by which the complainant charged that the defendants were using a certain machine for the manufacture of hat-bodies, which infringed a patent originally granted in 1856 to a certain A. B. Taylor, and subsequently, in 1860, *reissued*, for hardening the bodies of hats by means of rollers while on the perforated cone upon which they had been formed, with a contrivance to give them the reciprocating motion required in the operation of being hardened. In the original patent of Taylor, of 1856, the claim was limited to his "*arrangement*" for hardening the body in a dry state, by "*machinery operating substantially as set forth.*" The complainant, who had purchased this patent, afterwards, however, saw the machine known as Boyden's, and more particularly described in the preceding case. He then (1860) surrendered his patent and obtained a reissue, in which he altered his claim of invention from an "arrangement of machinery" to a claim for a "vibrating concave surface."

The difference between the invention as claimed in the original patent, and as subsequently set forth, as well as the general nature of his invention and claim, will appear more minutely by the juxtaposition of them in parallel columns.

Original Patent, 1856.

The object of my improvements is to harden the bat sufficiently to permit it to be removed from the perforated cone without the application of water, and to facilitate the removal of the bat from the cone without requiring the latter to be taken from its position in the machine. These improvements consist in a mechanical process of hardening the bat before it is removed from the cone, and in facilitating the removal of the bat from the cone by means of a blast of

Reissue, 1860.

My said invention, which relates to the hardening of the bat on the pervious cone on which it is formed, and while the fibres constituting the bat are held to the surface of the cone by the pressure of the surrounding air, consists in combining with a perforated cone, on which the bat of the fibres is held by the pressure of the surrounding air, a *vibrating concave surface, held by pressure, so as to act on the convex surface of the bat as it is vibrated*, by means of which combina-

air forced through the cone. There are also various improvements in the arrangement and construction of the machinery devised by me, as will hereinafter more fully appear.

Claim.

What I claim as my invention and desire to secure by Letters Patent, is the arrangement for hardening the hat-body in a dry state, by *machinery operating substantially as herein set forth.*

tion a large segment of the bat, along its entire length, is acted upon at once by the concave surface, while, by the rotation, every part of the circumference is brought, in succession, under the hardening operation.

Claim.

What I claim as my invention is, the combination *of a vibrating concave surface,* substantially as described, with an exhausted pervious cone, on which the bat of flocculent fibres is held by the pressure of the surrounding air, *substantially as and for the purpose specified.*

The argument was chiefly upon the points, how far the reissue was for a principle or function as distinguished from a machine, and how far such a patent was valid; and also, whether the reissue was or was not for the same thing granted in the original patent; matters discussed much more fully in the principal case.

Mr. Justice GRIER delivered the opinion of the court.

After the observations made in the preceding and principal case, it is not necessary to make further remarks on the art of extending patents. It may be ranked "INTER INGENUAS ARTES," and may have the claim of novelty, if not of usefulness.

In this case, the invention of Taylor was the application of pressure by means of rollers, with a contrivance to give them the reciprocating motion necessary to this process of hardening. He was not the inventor of the conical cover used in hardening hat-bodies formed on a cone, nor of rubbing them by a reciprocating motion, but merely of a certain combination of devices to produce a certain effect. Both the operation and the result were well known, and the invention consisted only of the devices combined to perform the operation and produce the result. It was open to every other person to make any other combination of devices to perform the operation, which was not a mere colorable adoption of the patentee's combination. The original specification of Taylor is drawn with sufficient care and

judgment to cover all the patentee knew he had invented, and the whole machine as described therein.

A comparison of the devices used in the two machines would be unintelligible without models or drawings. The Taylor patent is but for a form, or rather a combination of known devices, to perform a certain operation and produce a certain desirable effect. The combination used by Boyden is not a mere colorable or substantial adoption of the same combination of devices. It has as much claim to originality as that of Taylor; but it has a vibrating concave surface of cloth, pressing against the cone. Accordingly, the reissued patent to Taylor, or rather to Burr, got up after an examination of Boyden's machine, contained this interpolation in the description of his invention, "*A vibrating concave surface held by pressure*," &c., &c.; and the claim extended to the "combination of a vibrating concave surface;" then follow the words, "*substantially as described.*" In a contest with a previous patent, the last words can be called in to qualify the first, and narrow it down to the peculiar combination of devices described; while, in assaulting a new combination, for the purpose of suppressing it, the claim may be stretched to cover every machine having a "concave vibrating surface," by calling all the other parts "equivalents."

It is plain that this interpolation of an abstract generalization, to render the specific description of the concrete machine more elastic, was suggested by an examination of the Boyden machine. If the same construction be given to the claim of Taylor, as it would necessarily invoke in a contest with preceding inventions, to save it from the charge of being too broad, the Boyden machine would be properly pronounced as no infringement: on the contrary, such a construction of it as would include the Boyden machine, would make it void for being too broad. It matters little on which horn of this dilemma the case be put, the result must necessarily be the same.

DECREE AFFIRMED WITH COSTS.