BARRETT ET AL. V. HALL ET AL.

Case No. 1,047.

{1 Mason, 447;[1] 1 Robb, Pat. Cas. 207.}

Circuit Court, D. Massachusetts. Oct. Term, 1818.

PATENTS FOR INVENTIONS—JOINT PATENT—PATENTABILITY—COMBINATION—SEPARATE IMPROVEMENTS—METHOD NOT PATENTABLE.

1. A joint patent may well be for a joint invention, but not for a Bole invention of one of the patentees. If each of the patentees obtain separate patents for the same invention, as his exclusive invention, and afterwards both obtain a joint patent for the same, as their joint invention, they are estopped by the joint patent to assert any title under the several patents.

{Cited in Butler v. Bainbridge, 29 Fed. 143.}

2. A patent may well be for a new combination of machines, whether the machines be old or new. But one patent cannot, at the same time, include an exclusive right in the combination and in each of the machines; and it is no infringement of a patent for the combination, to use either of the machines separately.

{Cited in Tyler v. Deval, Case No. 14,307; Olcott v. Hawkins, Id. 10,480; Smith v. Downing, Id. 13,036; Brooks v. Norcross, Id. 1,957; in re Boughton, Id. 1,696; Stimpson v. Woodman, 10 Wall. (77 U. S.) 126; Rees v. Gould, 15 Wall. (82 U. S.) 194; Craig v. Smith, Case No. 3,339.}

3. There must be several patents for several improvements of distinct machines.

{Cited in Wyeth v. Stone, Case No. 18,107; Emerson v. Hogg, Id. 4,440; Sessions v. Romadka, 21 Fed. 132.}

{4. Cited in Hogg v. Emerson, 6 How. (47 U. S.) 483, as supporting the point that patents may be united if two or more, included in one set of letters, relate to a like subject, or are in their nature or operation connected together.}

5. A patent for an improved machine must show in the specification, in what the improvement precisely consists; and the patent be limited to those improvements. If not specified, the patent is void for ambiguity; if broader than the improvements, it is void on other grounds.

{Cited in Hogg v. Emerson, 6 How. (47 U. S.) 483; Blake v. Stafford, Case No. 1,504.}

6. Where a combination of machinery exists up to a certain point and the patentee makes an improvement, he should not include in his patent the whole machinery; but only the improvement

{Cited in Hovey v. Stevens, Case No. 6,746; Potter v. Holland, Id. 11,330; Seymour v. Osborne, 11 Wall. (78 U. S.) 549; Hopkins & D. Manuf'g Co. v. Corbin, Case No. 6,695.}

{Cited in Ex parte Berry, Case No. 1,353, as to what constitutes a combination.}

7. If a party make an improvement on an existing machine, or invent a new machine, his patent should not be for a method, but for his machine, or improved machine.

{Cited in Potter v. Holland, Case No. 11,330; Rees v. Gould, 15 Wall. (82 U. S.) 187.}

{8. Cited in Valentine v. Marshall, Case No. 16,812a, and Smith v. Downing, Cases Nos. 13,035a and 13,036, to the point that the character of an infringement, as such, is not affected by a mere alteration in form and proportion, so as not to materially affect results, nor by the substitution of mechanical equivalents to attain the same end.}

[9. Cited in Keene v. "Wheatley, Case No. 7,044, to the statement that the doctrine of patents constitutes the metaphysics of the law.]

[10. Cited in Earth Closet Co. v. Fenner, Case No. 4,249, to the point that, on application for a provisional injunction in a patent case, proper expert demonstration of the patents or articles involved should, in the discretion of the court, be applied in the solution of the necessary questions of law governing the case.]

At law. Case for the infringement of a patent granted for "A new and useful improvement, being a mode of dying and finishing all kinds of silk woven goods," [by William Barrett and Abner Stearns against Hall and others.] Plea, the general issue, with a specification of special matter of defense. [Verdict for plaintiffs. Heard on motion for new trial. Granted.]

The patent was granted on the 9th day of September, 1818; and after reciting, that the plaintiffs had alleged, that they had invented "a new and useful improvement, being a mode of dying and finishing all kinds of silk woven goods," granted to the plaintiffs "the full and exclusive right and liberty of making, constructing, using and vending to others to be used, the said improvement, a description whereof is given in the words of the said Abner Stearns and the said "William Barrett themselves, in the schedule hereto annexed, and is made a part of these presents," for the term of four years from the 12th day of May, 1818. The specification, annexed to the letters patent, contained a description of two machines; one a reel, on which spirally to wind and secure the silk, and put it into the dye; the other, a frame for the purpose of extending and finishing the silk, after it is dyed.[2] At the trial it was admitted, that the infringement of the plaintiffs' patent, if any, was by the use of the reel only; and that the defendant did not use the silk frame, either in connexion with, or separately from, the reel. The plaintiffs stated their improvements to consist, 1, in the spiral winding of the silk on more arms than four arms, so as to assume the shape of a circular spiral, instead of a square spiral. 2dly. In the use of small pins, obliquely placed on the arms of the reels, to hook the selvages of the cloth, and hold it in a spiral form. 3dly. In separating the opposite arms gradually, by the means of a screw, and thus gradually extending the silk. 4thly. In the use of side bars to sustain the screw, and prevent it from turning with the machine, when it was not wished. It appeared in evidence, that reels with four arms had been used before the granting of the patent, with tenter hooks (instead of pins) to wind the silk on in a square spiral. And the use of a screw, for the purpose of gradually separating the opposite arms, was described in a book printed in London, in the year 1789, entitled the "Art of Dying Cotton and Linen Thread; together with the Method of Stamping Silk, Cottons," &c p. 501.-"Square vats are therefore constructed, about six feet deep, and three and a half wide, and about three feet in the ground, for the conveniency of the dyer. The cloth is then fixed by the selvages to two wooden frames, each composed of four bars, and of such a length, as to be easily moved backward and forward in the vat. These frames are held together by means of a

screw, so as to be easily let out or taken in, according to the breadth of the cloth. The cloth is supported by little iron

hooks, passed through the selvage at the opposite sides, to keep it as it were in folds throughout the piece. The whole thus arranged is suspended with a pulley over the vat, by means of cords fixed to each corner of the frame, and uniting in the middle, so that by slackening the pulley, the linen is dipped without being rumpled. When necessary to air and ungreen, by drawing the pulley the frame rises, and the cloth drains into the vat."

The witnesses at the trial gave different opinions as to the exact form of the machine, which was intended in this description; and all seemed to think it somewhat ambiguous. But the fact, that the screw was to be used, as in the plaintiff's reel, was agreed on all sides. The reels, in fact, used by the plaintiffs had eight arms. The reels used by the defendants had ten arms. Instead of pins, the defendants used on their reels staples, with a short barb to catch the silk in the first instance; and the silk was then secured on the reels by a rod running through the selvage, and through the holes in the staples. Instead of a screw, the defendants used a rack and pinion (which, it was admitted on all sides, was a different mechanical power) to separate the opposite arms after the silk was op the reel. In the spiral winding of the silk, the reels of the plaintiffs and the defendants were alike. Some of the witnesses were of opinion, that the reels were alike in what they called principle; others were of an opposite opinion. All of them, however, agreed as to the specific agreements and differences between them. It farther appeared in evidence, that in the year 1809, the plaintiffs severally obtained patents from the department of state for the same invention, each of them then claiming and swearing, that he was the sole inventor; and neither of these patents had ever been repealed. Stearns v. Barrett, [Case No. 13,337.]

The jury found a verdict for the plaintiffs.

And a motion for a new trial was made by Gallison and Prescott, for defendants, upon the following grounds:

1st. Because if the patent, which is declared upon in this action, be construed as a patent for the entire machine, called a reel, described in the specification, then the same includes parts, which at the trial were proved, and in the said specification are admitted to have existed, in combination in a machine for similar purposes, long before the supposed invention of the plaintiffs, to wit, in the reel composed of four arms, or two cross pieces, on which it was admitted, that the cloth was wound in a square spiral, which reel is described in said specification as before in use; and the judge, who charged the jury at the trial of said issue, did direct them, that merely increasing the number of arms was not an invention, that would in law entitle the plaintiffs to a patent, no certain number of arms being claimed in said specification; and did also direct them, that as it respected this patent, if the former square reel was believed to have been in use

before the invention claimed in this patent, the defendants had a right to use the reel-head, resembling the hub and spokes of a wheel, and also the spiral form of winding the cloth; and that the said patent, if it extended to the whole machine, and went to secure the exclusive right to every part there of, as the invention of the plaintiffs, was broader than their invention, and therefore void. And therefore the said jury, upon this construction of the patent, in returning their said verdict, must either have found, that the said square reel did not so exist, which is against the admission of the specification, and the admissions and evidence of the plaintiffs at the trial; or, admitting the above fact, they must have gone upon the supposition, that notwithstanding such prior use, the same might be secured by patent to the plaintiffs; and that their said patent was not thereby rendered void; in which case their said verdict is against the direction of the judge in the matter of law.

2dly. Because, if the said patent be construed as a patent for an improved machine, or for a certain combination, consisting of the machine known and used before, as set forth in the specification, and of certain improvements added thereto by the plaintiffs, then the right of the plaintiffs under their said patent, must be confined to that precise combination; and it was necessary, in order to support the plaintiffs' case, and the judge, who tried the cause, did so direct the jury, that the machine used by the defendants should, in all material and essential respects, be like the machine described in the plaintiffs' specification; otherwise the combinations would not be identically the same, and therefore there would be no Infringement; and that, if the rack and pinion was an essentially different mechanical power from the screw, then there appeared a substantial difference between the two machines, which destroyed their identity; and therefore, inasmuch as it was evident on inspection, that the rack and pinion was employed in the defendants' machine to produce the same effect, for which the screw is employed in the plaintiffs' machine, and it was also proved by divers witnesses on both sides, and was not contradicted, that the rack and pinion is a mechanical power essentially different from the screw, the said jury must have returned their verdict in this particular, either against the evidence or against the direction of the judge, in the matter of law.

3dly. Because, at the said trial, it was clearly proved by the testimony of Allan Pollock, by the admission of the plaintiffs and by a public work, that hooks of different form and sizes, and of different degrees of finish and fineness, according to the nature of the cloth, had been used for the purpose of extending cloth upon frames, many years before the pretended invention of the plaintiffs; and this evidence was not contradicted by any other evidence in the cause. And it was also proved by the said public work, and by witnesses produced, both by plaintiffs and defendants, to show the meaning of the description contained in the said public work,

and was not contradicted by any other evidence in the cause, that many years before the said supposed invention of the plaintiffs, the screw axis was known, and had been used and applied for the purpose of moving one frame from or towards another, according to the width of cloth attached to said frames to be dyed. And it also appeared, and was admitted by the said plaintiffs in their specification, that before their said supposed discovery, a reel was in use for like purpose, consisting of four arms or two cross-pieces; and it also appeared and was admitted, that on such reel the cloth was wound in a square spiral, by means of tenter-hooks set upon the arms; and there were no other improvements claimed to have been made in any essential parts upon the said square reel, admitted by the said specification to have been before in use, excepting only the increasing of the number of arms, (which the said judge directed the jury was not an invention, that would in law entitle the party to a patent, no certain number being set out in said specification; and as to which, it appeared from inspection of the machine used by the defendants, that it consisted of eight arms only, while the machine produced by the plaintiffs consisted of ten,) the using of finished curved hooks, placed diagonally in the sides of the arms instead of tenter-hooks formerly in use, and the aforesaid application of the screws. And the said judge directed the jury upon these facts, that if any or all of these improvements had been used by the defendants, yet if none of the same was new in its principle or mode of application, the plaintiffs could not, in point of law, support their action for such use; and therefore the said verdict, in this respect, is either against the evidence, or against the direction of the judge in the matter of law.

4thly. Because it appeared in evidence as aforesaid, and was not contradicted by any testimony, that the screw had been applied for stretching cloth between two frames, in the same manner as in the plaintiffs' machine, long before the supposed discovery of the plaintiffs; and the said judge directed the jury, that, taking this fact to be true, if the said patent was construed as a patent for the improvements made in said square reel by the plaintiffs, then the said patent included, what was not invented by the plaintiffs, to wit, the said application of the screw, and, therefore, upon this construction of the patent, the said verdict is against the evidence, or against the direction of the judge in the matter of law.

5thly. Because at the said trial it was proved by an inspection of the machines, that the power, which moved the moveable frame or reel-head in one was a screw, and in the other a rack and pinion; and it was also testified, and was not contradicted, that these are essentially different mechanical powers. And it also appeared, by inspection of said machines, and from divers witnesses, whose testimony was not contradicted, that the cloth upon the defendants' machine is secured to the arms by rods passing through staples, and through the selvages of the cloth; and that the purpose and design of certain small barbs, cut upon said staples, is merely to hold the cloth until the rods are pushed through; and

it also appeared, that said staples and barbs resembled more the tenter-hooks admitted to have been long in common use, than the hooks or pinion of the plaintiffs' machine; and it also appeared, that in the plaintiffs' machine the cloth is attached and secured by means of curved hooks, or pins passing through the selvages, and holding the cloth through the whole operation of dying; and it also appeared, that these two parts of the machine were the only essential parts, which had been improved by the plaintiffs, no other improvement being set out in their specification. Wherefore the said verdict is against the weight of evidence and also against law, in finding the said defendants guilty of an infringement of the plaintiffs' rights.

6thly. Because the said judge, in charging the jury, did direct them, for the purposes of this trial, that the existence of two prior patents for the same thing, granted to the same patentees respectively, although both of said patents be still in force, did not affect the validity of the patent declared on. And did also direct them, for the purposes of this trial, that the oaths of said plaintiffs respectively made when they obtained the said prior patents, that they severally believed themselves to be true and original inventors of said machine, did not conclude them to show a joint invention of the same machine, and to claim as joint patentees therefor, both which directions the said defendants respectfully submit are incorrect in point of law.

7thly. Because the said jury, upon the whole weight of evidence produced at the trial, and upon the matters of law, in which they were instructed by the judge, ought to have returned their verdict, that the defendants were not guilty; yet, against the said weight of evidence, and against the said directions in matters of law, they have returned their said verdict, that the said defendants are guilty.

G. Sullivan, for plaintiffs, argued e contra.

Our statute differs materially from the statute of James. Under the statute of James the inventor applies for, and obtains a patent, in which is contained a description, comprehending his whole invention. But a proviso is inserted in the patent, requiring the inventor to file in chancery a specific and minute statement of what he claims as his invention. This specification is matter of record in chancery; and whether this describes less than is contained in the patent, may

well be considered, in many cases, as mere matter of law. Hence it happens that the question, whether the patent is broader than the invention, is sometimes in England decided by the court So also, under the statute of James, the court determines what is principle, or that character, which essentially constitutes the difference or identity of machines. But in both these particulars, the patent law of the "United States makes express provision. In respect to the principle of a machine, the statute expressly defines principle or character to be that thing, what ever it may be, whether it be found in structure or operation, or modes of operation, whereby the alleged invention may be distinguished from all others. Hence the courts of the United States are not required to define principle. Nay, they have no power to direct the jury, that this, or that, or other structure, constitutes the character of a machine, whereby it is distinguished from all other inventions. The judges, as I apprehend the law, must admit all evidence offered by either party, from witnesses acquainted with the particular art or machinery in question, whereby the true character or distinguishing principle of the machinery may be proved. And then they are to put it to the jury as a mere matter of fact, to determine upon evidence, what constitutes the distinguishing principle of the machines in question before them, and whether that distinguishing principle, be it in structure, operation, or mode of operation, do or not exist in both machines, so as to constitute them essentially the same or different If this were not so, the judges would draw to themselves the decision of matters of fact; for surely the question, what it is that constitutes the distinctive character of a machine, whereby it is distinguished from all others, is plainly matter of fact; and it cannot be disputed, that whether this same principle do or not exist in the plaintiffs' and defendants' machines, is also mere matter of fact So, whether the patentee have invented any thing that is new and useful, is merely a question of fact; for otherwise the court must determine, what has existed before; for what has existed before must be shown in evidence, or the court must be presumed, nay required to know; and surely what has existed, is, beyond all controversy, matter of fact Suppose the defendants insist, that the patent is claimed for a bare philosophical principle. This in like manner must be referred to the jury, unless mechanical philosophy be law, and as such be presumed to exist in the breast of the court So if there be a question, whether the description specified be sufficient to enable artists to manufacture the machine, the sufficiency or insufficiency Is matter of fact to be given in evidence by artists, or the court must assume to itself a paramount knowledge of all arts and manufactures, and in doing so, assume the decision of mere matter of fact Nay, as

I apprehend the law, if there be evidence on both sides, the court have not the power to determine on which side the weight of evidence appears, this being exclusively within the province of the jury; and the court have no power in such a case to set aside a verdict, merely because they think the verdict is against the weight of evidence. So also if there be a patent for an improvement in a patented invention, and the question arise under the

second section of the patent law, whether the alleged improvement be simply a change in the form or proportions of a machine, this is clearly a question of fact to the jury. In like manner, all the questions arising under the sixth section, whether the specification do or not contain the whole truth relative to the discovery; whether it contains more or less than is necessary to produce the described effect, and so made for the purpose of deceiving the public; whether the thing described in the patent was or not originally discovered by the patentee, or had been in use before; whether the invention had been described in some public work, anterior to the supposed discovery of the patentee; all these are mere questions of fact, and such the statute expressly makes them, when it denominates the subject of these questions special matter, and provides that it may be given in evidence, if notice thereof be filed thirty days before the trial. Thus it appears, that whatever may be the practice of the English courts under the statute of James, in relation to the extent of the patent beyond the invention, it is clearly matter of fact here, whether the patent contain more than the invention, that is, in the English technical phraseology, whether the patent be or not broader than the invention. And this brings us to the other point of difference, between our act of congress and the statute of James, which respects the power of the court to decide, if the patent is broader than the invention. And here it is only necessary to remark summarily after what is said above, that if the decision of the question is drawn to the court in England, it is merely a question of fact in this country, and as such to be determined by a jury upon evidence.

In this place it may be pertinent to consider, what evidence is to be received, touching the difference or identity of machines. Certainly it is not to be expected, that the court should be informed upon all the principles of mechanics, nor, if they were, is it to be allowed, that their direction to the jury on these matters of fact can be regarded as more imperative than in other cases of fact. If there be a question of seaworthiness of a ship, the court may well lay down the rule, that the vessel must be capable of performing the voyage insured. But after it is proved the vessel was defective in certain of her timbers, it surely is competent to both parties to adduce evidence to show, that these defects do or not render the ship incapable of performing the voyage. And whatever

may be the private opinion of the court, they must submit the question to the determination of the jury, upon the evidence produced. So in questions of deviation, and many others of the like kind.

Now in the case before the court, the question of the identity of the machines was a mere matter of fact. It was testified, that they had the same character, and were in principle the same. There was evidence to this point on both sides, and the jury found their identity. They were in fact the same. The substitution of the rack and pinion, it will appear, when the nature of mechanical powers is considered, makes no difference. "What are mechanical powers? They are only the means of augmenting the force applied, and this is uniformly done in the inverse ratio of the velocity of that force. These powers are common to the whole mechanical world, and no patent can be obtained for the application of them as powers. But the patent goes for that new and useful structure of constituent parts, whereby the powers being applied, certain new and useful effects are produced. Now what was this structure of essential constituent parts in the machines before the court? It was the moveable set of arms sliding on the two square bars, passing through the hub of said moving set of arms, whereon this was made to traverse by means of a mechanical power applied. It was obvious to any mechanical mind, and so Col. Baldwin testified, that the screw, or the rack and pinion might be indifferently applied to the same structure. Indeed, the lever, the pulley and weight, and other powers, might be also applied to the same structure or constituent parts of the machinery. All these powers would subserve the same purpose, and by precisely the same means, that is, by augmenting the force in the inverse ratio of the velocity with which the force moved, and of course regulating the force by a gradual movement. Indeed, there can be no better test on earth of the identity of machines, than that their structure is such, that different powers may be indifferently applied to precisely the same constituent parts, and the operations of those parts, and the effects produced by the application of one or the other power be the same. At all events, whether the substitution of one power, instead of another, do or not constitute a difference, must be a question for the jury, which they are to determine upon the evidence of intelligent mechanicians. To test this yet farther, let it be supposed, that the defendant had applied for and obtained a patent as for an improvement on the plaintiff's machine, and had specified the substitution of the rack and pinion, it is clear, that in an action by the defendants against a party for an infringement, it would be competent for such party to raise the question, whether the application of the rack and pinion were any thing more than a simple change of form. From evidence disclosed in this case, it might be made to appear, that there was no difference in the effect, and no difference in the structure of the constituent essential parts of the machine, whereby the operation of stretching the silk is obtained. It would also appear that the force applied to give motion to the moving set of arms is augmented and graduated in the same ratio, and quoad these machines, if Col.

Baldwin and others are believed, is the same. At all events, whether it were so or not, would be a question of fact to the jury; and if they were of opinion, that the substitution of the rack and pinion was simply a change in form, the defendants in such case could not hold their patent, because the statute says, simply changing the form shall not be deemed a discovery. Again, if on the contrary the application of a rack and pinion were not found to be simply a change in form, but an improvement, and this were the improvement specified, the defendants could not use the constituent parts of the machine, because the statute, second section, expressly enacts, that the patentee of the improvement shall not be at liberty to use the original discovery; and surely, if the defendants could not use the discovery of the plaintiffs, if the defendants were patentees of the application of the rack as an improvement, a fortiori they could not use the plaintiff's discovery now, that they are not patentees of an improvement Here the defendants may contend, that the plaintiffs have not specified their original discovery, so that the same may be distinguished from what was known before; and whether they have or not, is next to be considered. Now the plaintiffs, in their specification, first describe the whole reel us used by them, and a machine in magnitude was produced. No objection was taken at the trial, as to the sufficiency of this description. It was fully admitted, that the whole machine, such as it appeared, was clearly described. Then the plaintiffs describe another reel, consisting of four arms and a square axle, through which axle some holes being made at certain distances, the moving sot of arms could be secured at the requisite distance, according to the width of the material wound upon the reel. This also was so clearly and distinctly described, that the defendants therefrom constructed in model a reel, conforming exactly to the description. "Whereupon the plaintiffs, in their specifications say, that the new reel is, in all material respects, an improvement upon the old reel, and for these material improvements they claim their patent Now, whether there are any such material improvements was matter of fact to the jury, and what these improvements were, was also matter of fact. Nothing could be plainer, than that a material difference existed, both in the effect produced, and in the mode of operation to produce that effect. The jury were satisfied, both as to the difference of the new from the old, and that this difference made the

new better than the old; and what is improvement, but being different and better? But, said the defendants, the patentees ought to have designated, in precise terms, the particular parts which constituted the difference. The answer to this doctrine is found in the statute. The inventor, says the third section, shall fully explain the principles and character by which the machine may be distinguished from other inventions. Now the new machine was fully described, so that artists could make one from the specification. The old machine was described, so that artists could make one like that from the description; and it was manifest on inspection and from the evidence, that they were in character materially different Certainty, to a common intent alone, is required. No precise or technical language is necessary. The public derive all the benefit, that the patent law contemplated securing to the public, and the patentee has secured to him no more than his invention. The jury found it so; and surely me court cannot otherwise decide, without assuming the determination of matters of fact. In the case of Harmar v. Playne, 11 East, 101, it was held, that a description of the old and description of the new machine in the same patent, although the description of the old was merely by recital of the former patent, was description enough of the improvement for which the patent was obtained. In the case of Boulton v. Bull, {2 H. Bl. 463,} it was held, that the description was sufficient, although no precise form or proportion of the condenser was described, nor its relative position to the cylinder named, nor the means of communication between the cylinder and condenser distinctly mentioned. It is enough, said the court, if an artist can produce the designed effect from the description contained in the specification. It cannot be, that inventors are required to describe pin for pin, screw for screw, and all the numerous unpatentable differences, that must exist in every machine, however new, in common with other machines. There are shades of difference in machines, which result from their original character, and like the shades of difference in the social and professional habits of men, which depend on their predominant passions or qualities, are seen and understood, but yet are without a name, nor is it in the power of language to describe them.

It is enough for the public, if artists can see and understand these distinctive or essential qualities of the machine from the specification. It is enough for the parties at a trial, if the jury perceive and comprehend them, and find them, in their opinion, sufficiently described in the patent or specification.

It comes next in course to consider the novel doctrine assumed by the defendants, that the plaintiffs must be considered as claiming a patent for the combination, such as it was exemplified in their machine, or else they must be considered as limited to special Improvements, and these they must designate. Having already considered the latter alternative, I proceed to consider the former. In the first place, there is not a word of combination in the plaintiffs' patent, nor would this be necessary to secure their invention, if this were in fact only a combination of such parts as, properly speaking, in relation to

mechanics could be combined; for the inventors are entitled to their patent, if they fully explain their invention, and the principle and character thereof, so as to distinguish it from all others known or used before; and surely this might be done in Evans' Case, [Evans v. Eaton, Case No. 4,559,] without using the word combination. But what is combination, and what parts may be combined? Is driving a nail, or turning a screw into a piece of wood a combination? Is putting arms or spokes to a hub-is putting two wheels to an axis, a combination? It is obvious enough, what combination is not. Nor is it less plain, what it is. The connexion of several distinct machines together, like Evans's mill, so as to be operated upon by one power, giving cooperative motion to all, is clearly a combination. There each machine has its characteristic, constituent parts-a being, a life of its own; but the connexion of a thousand dead parts in one machine, having but one single simple operation, can never be considered a combination.[3] A watch is a combination; for the main-spring Is one power, and puts the whole machine into operation, but the hair-spring is a power that regulates this motion. Here, then, are two distinct operations. So in the card machine of Whittemore, there is a combination of parts, each performing a distinct operation, and the whole acted upon and regulated by numerous powers. But in the plaintiffs' reel there is but one power, and one single simple operation, that of moving the traversing set of arms; and it is said, "that some machines are so simple, that they cannot be considered as combinations." The reel, therefore, of the plaintiffs cannot be regarded as a combination. But if it were, and the only alleged difference were the use of the rack and pinion instead of the screw, the question of difference is for the jury; and they are to decide, "whether, on the whole, there is any substantial difference between the machines, or whether they are substantially the same. Slight or colorable differences will not protect the defendants in their infringement, or defeat the right of the patentee;" and this brings us back to the general question of identity, Which lies exclusively within the province of the jury; for infringement or not of course identity or not, says Judge Booke, is for the jury to decide.

I have now considered the several questions made at the trial, and have shown, as it is believed, that the questions, whether the

plaintiffs jointly invented the reel, whether the patent is broader than the invention, and whether the improvement, as such, is sufficiently described for all the purposes of the patent law, are all purely questions of fact. And I have also shown, as it is believed, and the doctrine of combination does not apply to the plaintiffs' reel; but whether it does or not, that the question of the identity of the defendants' and plaintiffs' machine is still the same, and is merely a question of fact.

In presenting this view of the subject, it will be perceived, that I have directly encountered all the objections taken in the defendants' motion, which are comprised in the first five causes assigned for a new trial. The first five causes are so involved with each other, that an attempt to give a special reply to each, would have left the whole subject in confusion. They altogether amount to this merely, that the plaintiffs have invented nothing; that if they have, their invention is not sufficiently described and distinguished in the specification; but if it is sufficiently described, the defendants have not used the plaintiffs' invention. All this is matter of fact, and as such, was properly submitted to the jury; and on all these points the evidence was either full for the plaintiffs, and uncontradicted, or else there was evidence on both sides; whence it follows, that the verdict for either of said five causes, or for the last, cannot be set aside as being against evidence.

As to the sixth cause, that the judge misdirected the jury touching the validity of the plaintiffs' joint patent, to wit, that it was valid, although patents for the same invention had been issued, in 1809, to each of the plaintiffs, as sole inventor of the same, and for aught that appeared, both the patents were in force when the action on the joint patent was commenced. The counsel for the plaintiffs is satisfied on authorities, that this direction was unexceptionable and correct. This is a new question in court, although a practice in the patent office has doubtless given many occasions of its being raised. But as this is not a point mainly in controversy now, I shall content myself with stating a few points of law, and citing the authorities, that support them.

It is a natural right, which every patentee hath, to surrender his invention, if the acceptance of it imposed no condition, which remained unperformed. In England a patentee may surrender his patent into chancery, (see Dyer's Case, 1 Dyer, 179, and notes,) and when the surrender is enrolled a vacatur is entered of course. This is by order of chancery according to ancient practice. But the circuit court of the United States has no cognizance in chancery of patents, nor has the law designated any mode, whereby a patentee may surrender his patent. In favor, therefore, of common rights, a court of common law will presume a surrender, wherever it is for the interest of a patentee, that he shall be considered as having surrendered. But the subsequent acceptance of a patent, which is incompatible with a former one, is in law an implied surrender of the former. The patents of 1809 are already inconsistent with the patent of 1818. Nay, the plaintiffs by their subsequent oath

of joint invention, have utterly defeated all title under their precedent patents, independently of the surrender; implied by the acceptance of the last patent.

Touching the plaintiffs' oaths as to their respective exclusive invention, it was regarded as clearly a matter of mistake, into which joint inventors might naturally fall when ignorant, as they each were, of the extent of the other's design and contrivance. In conclusion it is proper to observe, that this motion for a new trial is an application to the sound discretion of the court for an equitable interposition of its powers. To what equitable consideration are these defendants entitled? Were they not the clerk and apprentice of the plaintiff, Barrett? Did they not learn of him the use of the machines in question? Did they not employ a workman of his to take the measurement of his machines, and then, from the very outset, engage him in a suite of contrivances, to approximate to the plaintiffs' machines, and yet to save the appearance of invasion of their rights, while in fact the original design of the defendants was unquestionably, by slight and colorable differences, to conceal the infringement they consciously intended. Surely it must be admitted on all hands, that the plaintiffs have invented a most valuable method of extending the silk for dying; and if a jury of the country, selected from that public, for whose benefit the patent is granted, are in truth satisfied on all the material points, it cannot be justice to perplex and harass the plaintiffs with the necessity of further suit to obtain enjoyment of their just right and privilege. Besides, it must be remembered, that patents in England receive a strict construction, because they are there considered as being in derogation of common right. Whereas, in the United States, they are more justly regarded as bounties upon the productions of genius, and as means of great and extensive benefit to the public. As such, they ought here to receive the most liberal construction; and no patent should be held void, if it in fact fulfil the ultimate design of the patent law; if it furnish in the specification a description essentially certain, to enable the public to avail itself of the invention after the patent term shall have expired. This is the object of the law; and to this, as the great end of all its provisions, ought the attention of the judiciary and juries to be directed.

STORY, Circuit Justice. This case has been argued for the plaintiffs, as fully and as ingeniously as its merits will allow, upon the

same principles and reasonings, "which were pressed upon the court at the trial. If they have failed to convince the understanding of the court, it is because in some instances the premises, and in others, the conclusions are radically unsound and inadmissible. I pass over all the learned lecture, as to what constitutes matter of fact and what of law, and what are the relative rights of courts and juries as to matters of fact, because no novelty and no instruction can attach themselves to the discussion. The whole doctrine lies in the elements of the common law, undisputed and indisputable. As little do I think it necessary to discuss the question, what constitutes the identity or diversity of machines in the abstract; or to philosophize respecting the different mechanical powers. My humble knowledge does not permit me to venture on such difficult topics, and fortunately my duties as a judge do not require me to master them. I am content on these, as on other occasions, to learn from those, who can give the proper instruction, and then to apply it to the solution of such questions of law, as are fit to be entertained here. To be sure, I must continue to believe, until better instructed, that the different mechanical powers are not one and the same power; and that a motion, which is communicated by a screw is not communicated in the same way as that by a lever, a wheel, a wedge, or a pulley. As to the opinion of skilful witnesses, whether the principles of two machines are the same, no person doubts, that it is competent evidence to be introduced into a patent cause. But care should be taken to distinguish, what is meant by a principle. In the minds of some men, a principle means an elementary truth, or power; so that in the view of such men, all machines, which perform their appropriate functions by motion, in whatever way produced, are alike in principle, since motion is the element employed. No one, however, in the least acquainted with law, would for a moment contend, that a principle in this sense is the subject of a patent; and if it were otherwise, it would put an end to all patents for all machines, which employed motion, for this has been known as a principle, or elementary power, from the beginning of time. The true legal meaning of the principle of a machine, with reference to the patent act, is the peculiar structure or constituent parts of such machine. And in this view the question may be very properly asked, in cases of doubt or complexity, of skilful persons, whether the principles of two machines be the same or different. Now, the principles of two machines may be the same, although the form or proportions may be different. They may substantially employ the same power in the same way, though the external mechanism be apparently different On the other hand, the principles of two machines may be very different, although their external structure may have great similarity in many respects. It would be exceedingly difficult to contend, that a machine, which raised water by a lever, was the same in principle with a machine, which raised it by a screw, a pulley, or a wedge, whatever in other respects might be the similarity of the apparatus. But, although the testimony of witnesses be admissible to prove the identity or diversity of machines in principle, yet, after all, it is but matter of

opinion; and its weight must be judged of by all the other circumstances of the case. It is infinitely more satisfactory to ascertain, if we can, the precise differences and agreements; and when these can be subjected to the eyes, they almost supersede all the evidence of mere opinion. In all my experience I can scarcely recollect a single instance, in which the general question, whether the principles of two machines were the same or different, has not produced from different witnesses, equally credible and equally intelligent, opposite answers. This could result only from the different meanings attached to the word, and from confounding its various senses. And this has been completely shown, when the same witnesses came to explain the precise agreements and differences, in which they have almost uniformly agreed. The case now before the court is a perfect proof in point. The witnesses differed as to the identity or diversity of the principles of the machines; but they were all agreed as to what were the precise differences and agreements in fact There seemed then nothing left "for the jury to decide, but whether these differences were substantial or formal; if substantial, then the machines were not alike; if formal only, then they were alike. And the question, whether the principles were the same in both machines, was in reality, when all the facts were given, rather a matter of law, than of the opinion of mechanics; at least matter of law was necessarily mixed up with it, which mechanics could not be presumed to be acquainted with.

The opinion, however, which I shall express, will not turn in any material respect upon any facts controverted at the trial. I shall discuss the motion for a new trial, so far as facts are concerned, upon the admissions and statements, which the plaintiffs did not and could not deny. The doctrine of patents may truly be said to constitute the metaphysics of the law. The difficulty lies, not so much in the general principles, as in the minute and subtle distinctions, which occasionally arise in the application of those principles. I will endeavour, however, to lay down some general rules, which appear to me to embrace the whole merits of the present controversy, and then apply those rules more pointedly to the facts of this case.

In the first place, a joint patent may well be granted upon, a joint invention. There is no difficulty in supposing in point of fact, that a complicated invention may be the gradual result of the combined mental operations

of two persons acting together, pari passu, in the invention. And if this be true, then as neither of them could justly claim to be the sole inventor in such a case, it must follow, that the invention is joint, and that they are jointly entitled to a patent. And so are the express words of the patent act—Act Feb. 21, 1793, c. 11, § 1, [1 Stat 318,]—which declares, that if any person or persons shall allege, that he or they have invented, &c. a patent shall be granted to him or them for the invention. In the next place, a joint patent cannot be sustained upon a sole invention of either of the patentees; for the patent act gives no right to a patent, except to the inventor; and requires an oath from the party, who claims a patent, that he is the true inventor. In the next place, a joint patent for an invention is utterly inconsistent with several patents for the same invention by the same patentees. For it is impossible, that any person can be, at the same time, the joint and sole inventor of the same invention. If, therefore, each of the joint patentees obtains a several patent for the same invention, as his own exclusive invention; and afterwards, without surrendering the first patent, they obtain a joint patent for the same as a joint invention, either the former sole patents are void, or the joint patent is void. For, besides the apparent inconsistency of the patents, if all could be sustained then a recovery upon the joint patent would be no bar to a suit upon the several patents; and the parties might obtain a double recompense for the same infringement. There is an additional reason, which deserves great consideration; and that Is, that if several and joint patents could be sustained by the same parties for the same Invention, they might be successively taken out, so that the term of the exclusive right might be prolonged for a great length of time, instead of being limited to fourteen years. I am therefore clearly of opinion, that a grant of a subsequent patent for an invention is an estoppel to the patentee to set up any prior grant for the same invention, which is inconsistent with the terms of the last grant. And I have very great doubts, whether, when a patent is once granted to any person for an invention, he can legally acquire any right under a subsequent patent for the same invention, unless his first patent be repealed for some original defect so that it might truly be said to be a void patent.

In the next place if several patents are taken out by several patentees for a several invention, and the same patentees afterwards take out a joint patent for the same as a joint invention, the parties are not absolutely estopped by the former patents from asserting the invention to be joint; but the former patents are very strong evidence against the joint invention. The reason of this doctrine is, not that estoppels are odious in the law, but that a party may innocently mistake, as to the extent of his own claims. And though a several and joint invention, by the same persons of the same thing, cannot exist in fact; yet a party may suppose, that he has invented, what in truth has been partly suggested by another mind.

In the present case, each of the plaintiffs (Barrett and Stearns) obtained, in the year 1809, a several patent for the present invention, as his sole invention; and the patent, on which this action is brought, is a joint patent granted in 1818. In this view, the doctrine already stated directly applies in the case. It is the same, as was stated to the jury at the trial, and on the most mature reflection, I adhere to it.

In the next place, a patent may be for a new combination of machines to produce certain effects; and this, whether the machines, constituting the combination, be new or old. But in such case, the patent being for the combination only, it is no infringement of the patent to use any of the machines separately, if the whole combination be not used; for in such a case the thing patented is not the separate machines, but the combination; and the statute gives no remedy, except for a violation of the thing patented. This was the doctrine of Mr. Justice Washington in his most able opinion in Evans v. Eaton, (Case No. 4,559;) and it has not been in the slightest degree shaken in the supreme court. Evans v. Eaton, 3 Wheat. [16 U. S. 454, 476, 506. I hesitate not one moment in adopting it, as established on solid foundations. It has indeed been said, that where there is a patent for the whole of a machine, whoever imitates it, either in whole or in part, is subject to an action at the suit of the patentee. Bovill v. Moore, 2 Marsh. 211. But supposing this doctrine to be true in any case and under any qualifications, (which may well be doubted,) it can apply, where the whole machine is entirely new, and cannot apply, where the patent is limited, by its very terms, to the combination of several machines.

Further. A patent under the general patent act, cannot embrace various distinct improvements or inventions; but in such case the party must take out separate patents. If the patentee has invented certain improved machines, which are capable of a distinct operation; and also has invented a combination of those machines to produce a connected result the same patent cannot at once be for the combination and for each of the improved machines; for the inventions are as distinct, as if the subjects were entirely different. A very significant doubt has been expressed on this subject by the supreme court; and I am persuaded, that the doubt can never be successfully removed. Evans v. Eaton, 3 Wheat. [16 U. S.] 454, 506.

Further. If a patent be for an improved machine, or for an improvement of a machine,—

for I follow Mr. Justice Heath (Boulton v. Bull, 2 H. Bl. 463, 482) and the supreme court (Evans v. Eaton, 3 Wheat [16 U. S.] 454) in thinking, that the meaning of the terms is substantially the same,—then the patent must state in what the improvement specifically consists; and it must be limited to such improvement if, therefore, the terms be so obscure or doubtful that the court cannot say, what is the particular improvement which the patentee claims, and to what it is limited, the patent is void for ambiguity. Macfarlane v. Price, 1 Starkie, 199. And if it covers more than this improvement, it is void for another reason, that it is broader than the invention.

Further. Where a combination of machinery already exists up to a certain point; and the patentee makes an addition or improvement to the machinery; he must confine his patent to the improvement; for if he takes a patent for the whole machine as improved, not distinguishing between the new and old, nor limiting his patent to the improvement, it is void, because, as so claimed, it is not his invention. Bovill v. Moore, 2 Marsh. 211.

Further. If an invention consist in a new combination of machinery, or in improvements upon an old machine to produce an old effect; the patent should be for the combined machinery, or improvements on the old machine, and not for a mere mode or device for producing such effects, detached from the machinery. This appears to have been the doctrine of all the judges in Boulton v. Bull, 2 H. Bl. 463, and was illustrated by several of the cases there put And in a recent case, where a patent was obtained for "an improved mode of lighting cities," it was held, that it was not supported by a specification describing an improved street lamp; and that the patent ought to have been for an improved street lamp. Cochrane v. Smethurst, 1 Starkie, 205. So, where the patent was for "a new invented manufacture of lace, called French, otherwise ground lace," and the specification went generally to the invention of mixing silk and cotton thread upon the frame; it being proved, that, prior to the patent, silk and cotton thread had been used together and intermixed upon the same frame, the court held the patent had, since the plaintiff claimed the exclusive liberty of making lace, composed of silk and cotton thread mixed, and not of any particular mode of mixing it; and the evidence proved it had been mixed before. King v. Else, 11 East, 109, note. This doctrine may not be of as extensive consequence under our patent act, where the specification forms a part of the patent, and may control its generality, as it is in England, where the specification is separated from it but it distinctly shows the necessity of an exact description so that the patent may conform to the invention.

Let us now apply these principles to the case at bar. The patent is "for a new and useful improvement, being a mode of dying and finishing all kinds of silk woven goods." If these terms alone were to be considered as descriptive of the subject matter of the patent, it would be open to the objection in Cochrane v. Smethurst, 1 Starkie, 205, for the specification shows no other mode of dying and finishing silks, than by the use of an improved

reel and an improved silk frame; and the patent ought to be for these improvements. But as the specification forms a part of the patent, and controls the generality of the preceding terms; it is to be construed a patent for a mode of dying and finishing silk woven goods, by means of an improved reel and an improved silk frame. The patent then is, not for a mode of dying alone, but of dying and finishing silks; and this, by means of the use of both machines, so that it is a patent for the machines in combination, and not separately. If so, then the defendants may use either of the machines separately, without infringing the patent right; for the exclusive right of the combination only is secured to the plaintiffs. In this view, there is an end of the present suit; for it is admitted by the plaintiffs, that the defendants did not use the silk frame, and that the only infringement, for which they seek a recompense, is the use of the reel. But if the patent could be construed, as a patent for each of the machines severally, as well as in the combination, then it would be void; because two separate inventions cannot be patented in one patent And the same objection would lie against it, if it were to be construed as a patent for each of the machines severally, and not in combination. If, however, all these difficulties could be surmounted, and the patent were to be construed as a patent for an improved reel and an improved frame separately, there remain other insuperable objections. There is no pretence, that the patent can be sustained for the whole reel, as a new invention, although some part of the language of the specification might lead to the conclusion, that the plaintiffs so intended to claim; for reels were in use before for the same purpose. And if it were otherwise, the plaintiffs could not recover; for the defendant does not use precisely the same machine; and if he did, the patent would be broader than the invention, and so void. The patent therefore must stand, if at all, as a patent for the improvements only upon the old reel. And what the improvements claimed by the plaintiffs are, must be decided exclusively by the terms of their specification. The words of the specification, after describing the improved reel, are:—"There has been, it Is said, a reel heretofore in use for the like purposes; but this, if it ever were so used, consisted of four arms, or two cross pieces, adjusted to a square axle; and the set of arms were kept separate or fixed upon the axle, not by a screw, but by pins passing through holes in said axle. Instead of pins affixed

to the arms, there were common tenter-hooks driven into the inner side of the arms, and the whole so constructed, as to be utterly inapplicable to the purposes of dying silk or other goods without great injury. The machine, for which the applicants claim a patent, is, in all material respects, an improvement upon this." This is the whole statement of the improvements in the reel, in the plaintiffs' specification. And assuming, that it is not utterly defective, from omitting to specify the particular improvements, for which the patent is claimed, (for a general statement, that the patented reel is in all material respects, without stating what these are, an improvement on the old reel, is no specification at all,) the plaintiffs have bound themselves to the improvements so specified, and cannot now claim beyond them. Rex v. Cutler, 1 Starkie, 354. Now, the plaintiffs have specified no particular number of arms to be used in their machine, as among their improvements, and therefore no particular number of arms is patented. The machine is stated by themselves to consist "of two sets of arms, each resembling in form the hub and spokes of a wheel, without the rim or fellies." There is, therefore, nothing new in this particular; and, in point of fact, the plaintiffs use eight arms and the defendants ten arms in their respective reels. The two principal improvements, actually specified, are the use of a screw, to separate gradually and keep apart the opposite arms of the reel, instead of a pin passing through a hole in the axle; and the use of oblique transverse pins to hold the selvages of the silk, instead of tenter hooks. Now, in point of fact, the defendant does not in his reel use the pins described in the specification, but staples with a small barb, which are at least as different in form and effect from the pins, as the pins are different from tenter hooks. And pins or hooks of all sizes and finish were proved at the trial to have been used for at least thirty years last past, for the same purpose. There is no pretence, that the staples and barbs used by the defendants are exactly in size, shape, and direction like the plaintiffs'. Then, as to the screw; it is a sufficient answer to the plaintiffs, that by their own showing the defendant never used the screw in his reels; but used a rack and pinion, which, it is agreed, is a different mechanical power. The only two improvements, therefore, which are specified, are not used by the defendant, either separately or in combination. How then is it possible to contend, that he has violated the plaintiffs' patent?

This is not all. The pin or hook used for this purpose is not a new invention. It has been long in use, and, as was proved at the trial, at least for thirty years. I do not say, that a pin or hook was used exactly of the same shape, dimensions, and oblique position, as that used by the plaintiffs. But it is to be considered, that the mere change of the form or proportions of any mechanical apparatus is not, by the express terms of the patent act, to be deemed a patentable invention. And as to the screw, its use for the very purpose proposed by the plaintiffs, Is completely described in the work cited at the bar, printed in 1789. The words are, "these frames are held together by means of a screw, so as to be easily let out, or taken in, according to the breadth of the cloth." If, therefore, the patent

could be considered as a patent for each of those improvements separately, it could not be sustained; for neither of them is new in substance. If, for the combined improvements, then, in the first place, the defendant has not used them; and, in the next place, the patent is broader than the invention; for, up to a certain point, the improvements existed before. The screw was in use for the same purpose, as early as 1789. But, if we could go beyond the patent and specification, and consider the patented improvements to be such improvements, as the plaintiffs now claim, it would not relieve the case from a single difficulty. The plaintiffs now claim in addition to the improvements already specified, 1st. The use of more arms than four to wind the silk in a spiral form. The silk was wound in a spiral form before; and surely it cannot be pretended, that the use of more than four arms on a reel or wheel was not known as well before as since the plaintiffs' invention. Besides; the plaintiffs have not specified any particular number of arms as their invention, and they never used but eight; and if such use constitute a separate invention, the defendant is at least as well entitled to claim the use of his ten as his own invention. If adding a given number of arms be an invention, adding a different number is not less an invention. 2dly. The plaintiffs claim the use of the side pieces to support and steady the screw during the operation. This Is not, as I recollect, used by the defendants for the same purpose; nor, if used separately with the screw, is it any thing new. If, therefore, the whole improvements, as now claimed, were specified in the schedule, the plaintiffs could not legally support a patent for them separately; and if they are claimed in combination, then the defendants have not infringed upon that combination; and if they had, the plaintiffs could not recover, because the combination up to a certain point existed (as they have shown) before. So that to sustain their patent in point of law, the plaintiffs are driven to construe it to be for the combination, and then the evidence of infringement fails them; and to sustain their suit in point of fact, they are obliged to construe their patent to be for the improvements severally, and then they fail upon the clearest principles of law applied to the facts.

I have thus gone over the whole grounds of this cause, and in every possible view, in which I can contemplate the law or the facts of the case, the verdict is wrong. Under such

circumstances, to suffer it to stand, would be a mockery of justice. It would be surrendering the whole rights of the community to the. mistakes or prejudices of juries. The public ought to know, that if a jury should be misled by the ingenuity or zeal of counsel, there is a redeeming spirit in the law itself; and that no judge in these times can be weak or wicked enough to abandon, what his duty plainly and peremptorily enjoins upon him. Let the verdict be set aside, and a new trial granted.

New trial granted.

[1] {Reported by William P. Mason, Esq.}

[2] Specification. The reel is designed to extend the silk, when immersed in the dye-stuff, so that this may pass freely and come in contact with the whole surface of the silk or material to he dyed, and yet the silk, or material, shall occupy the smallest possible or convenient space in the dye-tub. This machine consists of two sets of arms, each resembling in form the hub and spokes of a wheel, without the rim or fellies. In the hub of one is formed a female screw; in the other, a smooth cylindrical hole, in which one end of the axle may freely turn. The axle consists of a male screw, except that one end thereof is turned smooth to adjust to the hole of the hub that is smooth, and the other end is for. an inch or two square, to receive the eye of a winch or crank. It is about three or five feet long. The male screw of the axle is cut, to fit the female screw in the hub, having the same therein. The two sets of arms are besides connected with each other by two square bars of wood or metallic substance like the axle. One end of each is securely fixed to the hub having the smooth hole, and the other ends are adjusted to square holes made in the other hub, through which they slip or pass as the hubs or set of arms are made to approach each other, and thus prevent the hubs from turning, as the screw axle is turned round for the purpose of approximating or withdrawing the sets of arms, to or from each other. Thus it is easy to perceive, that with one set of arms held on to the smooth cylindrical end of the axle, by a pin and washer or otherwise, so that the axle may freely turn therein, or in the hub thereof; the other set of arms, having the female screw, will be made to approximate to or recede from this, as the screw axle may be turned to or from, by a handle or winch affixed to the square end of the axle. The utility of this movement will presently appear. The hub of the sets of arms may be made of any convenient size. The dimensions adopted in practice at present are as follows:-The material any metal or metallic composition. The last, however, has been adopted in practice. The hub is about five inches in diameter, and two inches through; is morticed to receive the arms, which are fiat square about sixteen inches long, but tapering from the hub to the end; and upon the sides of these arms or spokes are secured small brass pins, which are so set in grooves, cut into the sides of these arms transversely and diagonally, that the pins point inward and upwards, and divergently from the axle. The distance between these pins is quite small, about three-sixteenths of an inch. The mode of applying the silk and

immersing the same, is as follows:-Both sets of arms, being placed on the axle as above represented, the machine is supported by the axle on two standards outside of the arms horizontally. The set with the female screw is then approximated by turning the winch to a distance from the other, a little less than the width of the material to be dyed. One end of the silk is then attached by the operator to opposite arms upon the pins therein nearest to the axle, and then the operator turning the machine a little for himself, the silk is further attached to the next arms by the pins nearest to the axle, and so on successively till the whole is attached and wound round upon the machine in a spiral form. Then turning the screw axle by the winch, the set of arms having the female screw therein, recedes by a regular motion susceptible of the most accurate adjustment to the width of the silk; and thus it is held perfectly extended between the arms and by the selvages, in such a manner as not to be in contact with itself, but to leave free passage for the dye-stuff to apply itself equally to every part of the whole surface; and in this state of tension it is immersed by operation of a tackle and fall attached to one end of the axle until it is properly saturated or dyed.

It is obvious, that the silk by this means may be most conveniently rinced, and most readily drained. Also it is apparent, that the position of the pins on the arms, they inclining upwards and bending a little from the operator, as he applies the silk, must facilitate both the application of the material for dying, and the disengagement thereof after this operation is performed.

There has been, it is said, a reel heretofore in use for like purpose; but this, if it ever were so used consisted of four arms or two cross pieces, adjusted to a square axle, and the set of arms were kept separate or fixed upon the axle, not by a screw, but by pins passing through holes in said axle. Instead of pins affixed to the arms, there were common tenter hooks driven into the inner side of the arms, and the whole so constructed as to be utterly inapplicable to the purpose of dying silk or other goods, without great injury. The machine for which these applicants claim a patent, is, in all material respects, an improvement upon this.

The design of the silk frame is to extend the silk for drying and finishing; and it is contemplated to use it for all kinds of goods, which, in the operation of dying, require to be so extended.

It is a wooden frame, consisting of fourteen posts, about four feet or more in height, connected by rails in such a manner, as to be perfectly solid and firm. The opposite posts are connected by two strong rails of about eight feet in length, one at the bottom, and one within a few inches of the top, well morticed and tenanted into the posts; while two strong pieces of plank lying upon the bottom connecting rail, leaving a space of about two feet more or less between them, one firmly secured to these said bottom rails. A strong rail is fastened to the posts throughout the whole length of the frame, and thus gives it

all the requisite solidity and firmness. Upon the upper rail connecting the opposite posts, which are placed at a distance of ten feet from post to post along the length of the frame, are lain two pieces of plank sixty feet long, and about eight or ten inches wide. These are made to move or slide in these upper rails, so that when the silk is attached to their inner edges, they may be withdrawn from each other, till the requisite degree of tension is obtained.

The mode, in which the silk is attached to the edges of these cheeks, and then the cheeks withdrawn, is as follows:-The inner edges of the cheeks are covered by a thin plate of copper, about half an inch wide, nicely attached thereto. Sixty pieces of wood, cut from board or plank, say, from an inch to an inch and a half, or two inches thick, about a foot long on one side, and cut up in a triangular form, are adjusted to each cheek. The base being, as above, one foot in length, it is attached by hinges to the superior surface of the cheeks, in such manner, that the edge of the base will coincide exactly with the inner edge of the cheek. when the piece rests on its base. On this too there is a copper edging, and thus, this copper edging, when these pieces are raised upon their basis, comes closely in contact with the copper edges along the line of the inner edges of the cheeks, and by firm pressure are made to hold the selvages of the silk, &c. To the outer side of these pieces, which are called lap-joints, are attached some iron stays, about six or eight inches long, being a little longer than the lap-joints are wide or high. These stays are attached by a staple, or eye, to the upper part of the lap-joints, and the foot of each is made to slide into a groove, cut in the superior surface of the cheek, and lined with copper, so that by forcing the foot of the stay into the groove, the lap-joint is made to press firmly upon the selvage of the silk, when lain upon the copper edge of the cheek. The silk is first secured by one selvage to one cheek; then the other cheek being approximated sufficiently, the operator in like manner applies the selvage to the other cheek edge, and secures it by successively raising up and securing the lap-joints. The former cheek is fastened to the upper rail by strong iron pins passing through this and the said connecting rails of opposite posts. The other cheek, which is called the front cheek, is then gradually withdrawn till the silk is perfectly extended. The mode of withdrawing the front cheek is thus: To this cheek opposite to each post all of which, on this side, rise two feet above the cheeks, are attached several pieces of iron, long enough to pass through the posts, on which pieces of iron are cut screw threads, so that nuts, being set in wheels and applied to said pieces of iron, by the turning of all the wheels simultaneously and with equal velocity, the whole front cheek is gradually withdrawn till the proper degree of tension in the silk is obtained. These wheels are put in motion by a chain band carefully adjusted, so that the links thereof embrace projections in the periphery, and the power is applied indifferently to either wheel, by a pin six or eight inches long thereto attached, to serve as a handle or winch.

There may be other modes of withdrawing the front cheek, but the special subject of

patent, for which letters are claimed, is the mode of securing the silk as above described by lap-joints, and the gradual and exact tension obtained by the withdrawing of the whole front cheek simultaneously and equally at one operation as aforesaid. In these and in all material respects, this frame is an improvement upon the pin frame formerly in use, and also a. frame, that was constructed to hold the selvages by pieces of board lain flat upon the cheeks, and pressed by wooden screws attaching them to the cheeks. The copper edges being a very considerable improvement on this last mentioned frame, which had become useless by reason of the absorption of the dye-stuffs in the wooden edges of the cheeks, and slabs or boards above mentioned.

The silk being thus extended, the ends thereof are secured by a cross bar set with pins, or by a piece of wood split so as to hold the ends, and the whole is ready for the operation of drying and finishing, which is done thus: Upon the pieces of plank, which are described as fastened upon the lower cross rails, that connect opposite posts, is placed a moveable car running on four wheels, which is made to contain coals and move at pleasure beneath the silk, as the operator proceeds in the finishing. This being accomplished, the silk is delivered from the lap-joints by removing or sliding away the stays, and may be immediately folded for use.

[3] [See Ex parte Berry, Case No. 1,353.]