Case No. 13,760.

TATHAM ET AL. V. LE ROY ET AL.

{2 Blatchf. 474.}[1]

Circuit Court, S. D. New York. Nov., 1852.

PATENTS—IDENTITY—PRODUCING DIFFERENT EFFECT—WHAT IS—INFRINGEMENT—MEASURE OF DAMAGES—MACHINE FOR MAKING LEAD PIPE.

1. The history of improvements in machinery for making lead pipe by pressure, given.
2. The rules of law for determining the question of identity between two machines, stated.
3. Effect of a mere change in form or proportions, or of the mere substitution of one mechanical equivalent for another.

{Cited in Norton v. Jensen, 49 Fed. 866.}

4. Tests for determining what is a substantial change in a machine.

{Cited in Worswick Manuf'g Co. v. City of Kansas, 38 Fed. 248; Kane v. Huggins Cracker & Candy Co., 44 Fed. 292.}

5. Where the plaintiff was the first to apply a hollow ram sliding upon a core in a cylinder to the making of lead pipe by pressure; (a cylinder sliding upon a rod not being new in machinery,) and, in his patent, claimed as his invention the constructing of the ram hollow, so as to slide upon the core, and the combination of the same with the core: *Held,* that the mere use of a hollow ram in combination with a core, in a machine for making lead pipe by pressure, would not be an infringement of the patent, but that there must be a use of such combination, in such a machine, in substantially the same way in which the plaintiff had applied it.
6. Where the change from a patented machine produces an effect, in the operation of the machine, different in kind, such difference in effect is evidence of a substantial change, although, without connecting the new effect with the change, the change might be only formal and unsubstantial.
7. But such new effect, in order to give materiality to an apparently formal change, must not consist in merely doing more work in a given time or in merely requiring less

power. These results, if found, must follow from the different effect in kind.

8. The rule of damages for the infringement of a patent, stated.

9. Interest, by way of damages, may be given by the jury, in an action for the infringement of a patent.

This was an action on the case, tried before NELSON, Circuit Justice, for the infringement of letters patent granted to the plaintiffs {Benjamin Tatham, Jr., and George N. Tatham} October 11th, 1841, for an "improvement in the machinery for making pipes or tubes of lead, tin, and other metallic substances." {See Case No. 13,762 and note}[2]. The defendants {Thomas O. Le Roy, and David. Smith} had used, in the manufacture of lead pipe, machinery constructed in accordance with the specification of letters patent granted to Samuel G. Cornell, August 21st, 1847, for an "improvement in lead pipe machinery." The material defence was non-infringement. The following extracts from the specification of Cornell's patent are sufficient to show the construction and operation of the machinery used by the defendants:

"My machine is applicable to the manufacture of pipes and tubes of lead, and such other metals and their alloys as are capable of being squeezed or forced, by means of great pressure, from a cylinder or receiver, through or between apertures, dies, cores or mandrels, when in a solid or semi-fluid state, and is mainly referable, in its general construction and purposes, to the machine patented by Thomas Burr in Great Britain, and described in the first volume of the first-series of the London Journal of Arts and Sciences. * * * In my machine, I use the hydraulic press, the lead cylinder or receiver, the columns or pillars connecting the hydraulic press with the lead cylinder, the movable ram for pressing the piston upon the lead in the cylinder or receiver, the dies and cores to give the

pipes the required form and calibre and dimensions, and such other parts of the old machines as may be necessary, substantially similar to the machine 710 of the said Thomas Burr, now in common use. * * * In the machines heretofore used, the die is placed in the lead cylinder—at the top thereof when the power is applied at the bottom, and at the bottom thereof when the power is applied at the top—and the core which forms the inner surface of the pipe and determines its calibre, is either attached to the piston, advancing before it through the lead, according to the method of Thomas Burr, or attached to a long stationary core-holder, passing through the platform of the press, through the piston or ram, and through the centre of the lead cylinder to its discharging end, and the core being attached to the upper end thereof, and passing through the centre of the die, adjusted and secured so as to remain stationary in its proper position; and the pipe is formed by pressing the whole mass of the lead upwards by means of the piston, forcing it through the aperture between the die and the core. This long core-holder is secured to the platform of the press and lead receiver, so as to remain stationary the one to the other, and the piston slides over it. This is the method of George N. and Benjamin Tatham, as described in their patent granted October 11th, 1841. In these methods, the core and core-holder, or other apparatus used for like purposes, are liable to be broken, or twisted, or bent, or otherwise displaced by the upward or the lateral pressure caused by the piston pressing against the metal, which may be of unequal density, or from any other cause, so that the pipes will be imperfect, and often useless, and the machinery often injured or broken. To obviate these difficulties, a bridge, cross-bar or guide-piece has been placed in the upper part of the lead cylinder, near the die, closely fitting the core-holder which passes through it, and firmly secured to the interior of the cylinder by means

of arms extending from the bridge to the inner surface of the cylinder, and there secured. This apparatus is to support the short or stationary core, or to guide the long core, and prevent its being displaced, or the core from being broken or bent. But it will be seen that in this method the mass of the lead in the cylinder, on being pressed upwards through the same, is divided by the arms into as many parts as there are arms, and, after passing the arms, is united and pressed together so as to adhere in its passage through the die. It is obvious, however, that the adhesion of these divisions will be more or less imperfect, and that the pipe formed in this way will be liable to burst under any considerable pressure. In all these methods, the great pressure required to lift the whole mass of the lead contained in the cylinder and force it through the die will, besides displacing or breaking the cores or the mandrels, often burst the lead cylinder and destroy the machine.

"The object attained by my improvement is, the forming of pipe in all cases at the point of contact of the piston and the lead, where the pressure is applied, without moving forward the whole mass of lead in the cylinder. This is the leading feature of my invention, and the various apparatus and the different arrangements and combinations thereof, hereinafter described, are all subsidiary to the accomplishment of this object, being the different methods by which it is accomplished. In my machine, instead of fixing the die in the upper or lower end of the lead cylinder, and there forming the pipe, in the manner above mentioned, I usually place and secure the die in the end of the piston which is to enter the lead cylinder and press against the lead. * * * Around the die proper packing is placed, to make it fit the lower orifice of the lead cylinder into which it is to pass. The piston is hollow, with an opening or openings * * near the bottom, to permit the passage of the formed

pipe downward through it, and thence out at one of the openings. In a right line with the centre of the piston, I place a long movable core-holder, extending from the top of the piston upward * * * through the middle of the lead cylinder, and beyond to the top of the frame. * * * This core-holder is of sufficient size and strength to sustain any pressure required, without being broken or bent, or otherwise displaced, and is connected with the ram by means of * * * cross-heads, * * * one of which is secured to the piston, and the other to the movable core-holder by * * * keys, * * * and the cross-heads are connected together and kept in their proper relative position by * * * connecting rods, * * * which are secured to the cross-heads by * * * nuts, * * * the die-holder or piston and the core-holder being thus relatively stationary the one to the other. The upper cross-head moves in, and is guided by a strong cast-iron frame * * * secured to the lead cylinder by bolts, or otherwise. The frame extends above the lead cylinder to which it is secured. * * In the top of the frame is placed an iron collar or bush, * * * through which the movable core-holder passes, and is adjusted and kept in its place by means of * * * set screws. * * * The upper cross-head, in the working of the machine, slides up and down in the frame, by means of which arrangement the movable core-holder is always kept in its proper position, that is, in right line with the centre of the piston. To the lower end of the movable core-holder I attach and properly secure the short core which is to form the interior surface of the pipe and determine its calibre, * * which is not required to be more than an inch or an inch and a half long in the working machine. The nuts * * * at the lower ends of the connecting rods * * * may be turned off to permit the 711 cross-heads to be moved further apart, thus separating the piston from the core-holder, to allow the die and core to he replaced or changed at pleasure. This being done, the core at the end of the

core-holder may be inserted in the centre of the die * * * and properly adjusted. The nuts are then screwed on, bringing the operating parts of the machine into their proper relative position, and there firmly securing them.

"The machine is thus made ready for operation. The piston, by means of the hydraulic ram, being moved up to the lower orifice of the lead cylinder, * * * the machine is charged with the metal in the ordinary way, and, when the metal is sufficiently set and cooled, the power is applied to the ram in the usual manner, causing it to press the piston upwards against the metal, which immediately flows downwards from the point where the pressure is applied, through the die and over the core, thus forming the pipe. The pipe, as it is formed, passes downward through the hollow piston, and out at the aperture, and is reeled in the ordinary way. When the metal in the cylinder is thus pressed out, the ram descends to the proper point, the cylinder is re-charged, and the process repeated in the usual manner. In my method, much less power is required than in the methods heretofore employed, as the pipe is formed at the head of the piston, by the pressure upon the lower portion of the metal, instead of being formed at the top of the cylinder, by forcing the whole mass of the lead upward through the die there placed. By reason of this greatly diminished pressure, and the peculiar construction and arrangement of the parts in my machine, neither the core nor core-holder is liable to be broken or bent, or otherwise injured or displaced; nor is the cylinder liable to burst by the lateral pressure. There being no division of the metal in the cylinder into parts by the bridge or guide before mentioned, as used in Hanson's plan, the pipe is much stronger and every way more perfect.

"Another great advantage of my method is the facility with which the dies and cores may be changed;

it being only necessary for that purpose to drop the piston a little below the lead cylinder, and loosen the nuts at the lower ends of the connecting rods, thereby separating the die and the core, which are readily renewed, and different ones substituted, and the nuts again screwed up and the parts adjusted as before. By placing the die in the movable core-holder or mandrel, as it may in this case be called, and fixing the short core to the piston, and adjusting the parts as before, the pipe will be formed in the movable mandrel, which may be made hollow for that purpose, instead of being formed in the piston, and will in that case pass upwards through the hollow mandrel, and out at the top. * * * But the machinery employed, and the principles upon which I form the pipe will be substantially the same in both methods, and the advantages over the old method equally important, * * *

"What I claim as my invention, and desire to secure by letters patent, is placing the die for forming the exterior surface of the pipe in the piston or the hollow mandrel, as the case may be, substantially as described, instead of placing it in the head of the lead cylinder, as has been heretofore done; so that, as the piston is forced into the cylinder, or the cylinder forced over the piston, the pipe will be formed at the point of pressure, without moving the mass of lead relatively to the cylinder; and, in combination therewith, I claim the cores for forming the interior surface of the pipe—the die and core being adjusted and held in their proper relative positions by any of the known methods."

Charles O'Conor, Francis B. Cutting, and George C. Goddard, for plaintiffs.

Daniel Lord, William Curtis Noyes, Charles M. Keller, and Edwin W. Stoughton, for defendants.

NELSON, Circuit Justice (charging jury). The first machine for making lead pipe by pressure was the Burr machine, which was constructed in 1820. In that

machine, the core which formed the bore of the pipe was fastened into the face of the ram, and extended through the cylinder and into the dig. Burr was the first person to whom it occurred that lead pipe could be made out of set or hard lead, by means of pressure. This machine was his contrivance to carry that idea into practical effect. It virtually failed, especially so in respect to the manufacture of pipe of the usual or ordinary size. It seems, from the testimony, to have been successful so far as respected the manufacture of pipe of two inches or two inches and a half in diameter, and above that size; but, for the ordinary size—under two inches—it was a failure, and it went out of use. What constituted the real difficulty in the way of the successful operation of the Burr machine is a matter of controversy, as you have seen during the course of this trial.

In 1837, an improvement was made upon this machine of Burr by the Hansons, which went into successful operation. This machine was patented by them in England on the 21st of August, 1837. The improvement consisted in making a bridge at the bottom or near the bottom of the cylinder, for the purpose of holding a short core, and was founded upon the development of a new and beautiful idea. They had discovered, for the first time, that lead, like steel or iron, was susceptible of being welded together after separation when solid; and they were thus enabled to construct a bridge at the bottom or near the bottom of the cylinder, in which they could insert a short core, where it could be kept firm and steady. The lead had to be forced through 712 the apertures in this bridge, which separated the mass when in a solid state; but it became re-united and welded together by means of pressure in the chamber beneath the bridge, and in the formation of the pipe as it was forced out of the die. The improvement was successful, and enabled the Hansons to make good

merchantable pipe, and to make it cheaper and better than by any previous mode of manufacturing it, so that it superseded all prior methods of making lead pipe. The correctness of this idea, that lead could be separated when hard, and re-united by pressure, like the re-union of welded iron or steel, has been fully established on a trial in this court, in which the Hanson machine was involved. The truth of this idea was denied by the most eminent chemists in New York upon that trial, and, as a consequence of their disbelief of the fact that this property belonged to the metal, they testified that the pipe was made, in the Hanson machine, while in a fluid state, because the welding of the lead in a set state was a physical impossibility. They stated that they had never known this property as belonging to lead. But the fact was proved, by actual experiment on the trial, to their entire satisfaction, and they afterwards came into court and admitted they were mistaken.

Now, although this machine thus constructed manufactured merchantable pipe, and superseded all modes of manufacture known at that time, yet it was subject to an imperfection which embarrassed the manufacturer. The re-union of the lead, after its separation in passing through the bridge, was not at all times complete throughout the length of the pipe made from a given charge; and hence, when the pipe was subjected to a considerable pressure of water, a flaw would sometimes appear. This, I believe, was the only defect ever imputed to the article manufactured by the Hanson machine.

The next improvement upon the Burr machine was the plaintiffs', in 1841—the one in question in this suit. They bored the solid ram of Burr, and, instead of fastening the core on the face of the rain, extended it through the ram, and fixed it firmly to the cross-head of the frame—the core extending, also, through the cylinder into the die. The bore of the ram is fitted to

the core or core-holder, either by adapting the aperture to it, or by packing, so that, when the machine is put in operation, the ram slides upon the core. The core, in the first place, is fastened to the cross-head, which is firm and immovable, differing in this respect from the Burr machine, in which the core was movable with the ram, being fastened upon its face. The core in the plaintiff's machine is also steadied by the aperture in the hollow ram, or by packing. The advantage in this over the arrangement of Burr, is in steadying the core or core-holder, and in preserving its centrality in reference to the die. This machine appears to have been entirely successful in the manufacture of lead pipe of any dimension.

I will now call your attention to what is claimed as new in the plaintiffs' patent. After the description of the construction of the machine, which is minutely given, the patentees wind up by claiming, first, "the long core or core-holder, formed and held stationary with relation to the dies, as described;" and, secondly, "the constructing of the piston B hollow, in the manner described, and the combination of the same with the long core or core-holder upon which the piston slides." The third claim relates to the reversed arrangement of the machinery in the working machine, which it is not important to describe.

The first and third claims are not in controversy, and may be left out of the case. The dispute between the parties is confined to the second claim. It is insisted by the plaintiffs that the peculiar arrangement covered by that claim gets rid of the defect in the Burr machine, of the unsteadiness of the core in the manufacturing of pipe of the ordinary size, and also gets rid of the defect in the Hanson machine, because it dispenses with the bridge; and that this arrangement has been infringed by the defendants. The arrangement enables the plaintiffs to use a strong core or core-holder, and to fix it firmly at the cross-head, and, by

the aperture in the ram and the packing, to preserve its centrality in relation to the die; by reason of which they have succeeded in making perfect pipe. This is, in substance, the new arrangement of the plaintiffs, and these are the advantages which they claim to have derived from the change, and from the improvement upon the previous machines.

Let me now call your attention to the construction of the defendants' machine. This, also, is claimed to be an improvement on the Burr machine. It was constructed some five or six years after the plaintiffs' improvement. It is arranged by boring the solid ram of Burr, and placing the die in the face of it, at the same time closing the bottom of Burr's cylinder, and fixing the core firmly at the bottom, where Burr's die was placed. The core extends through the cylinder and into the die thus fixed in the face of the ram. In the operation of the machine, the core passes through the die and into the hollow ram nearly the length of it, the pipe, of course, passing through the same aperture above.

It will be necessary for you to examine the arrangement and construction of these two machines, in the particulars that I have mentioned, with great care and attention, because the determination of the case will hinge mainly, if not exclusively, upon the judgment you shall form in respect to them and their operation. In other words, the case depends upon the opinion you shall form of the substantial identity or want of identity between the two, as it respects the arrangement of the hollow piston and the core or core-holder found in them, and the operation and effect of the same in the manufacture of pipe. If, in looking at the arrangement and combination of the two, you arrive at the conclusion that they 713 are substantially the same, then the use of the defendants' is an infringement of the plaintiffs'. If, on the contrary, you arrive at the conclusion that they are not

substantially the same, then the defendants will be entitled to your verdict.

These questions of identity between two opposing machines are frequently exceedingly difficult, and often the most difficult questions involved in these patent cases. The question is ultimately one of fact, and the jury must examine it with a consciousness that they are to be responsible for its determination.

There are some principles of law bearing upon these questions which may shed some light upon your examination of them, and which it is proper should be stated. A change in form from the construction of an existing machine, is not a substantial change in the eye of the patent law; nor is a change in proportions. These changes require no great ingenuity, at all events they do not call for the exercise of the inventive faculties. They are simply the work of a mechanic of ordinary skill, and, therefore, are entitled to no particular consideration when we are inquiring into the question of identity between the construction of two machines. So, also, the substitution of a mechanical equivalent, as it is termed, in the construction of a machine, is not a substantial change. There are many devices in construction that can be made by a skilful mechanic, differing very much from each other in appearance, but which, in the eye of the patent law, are regarded as identical. For instance, an inventor, in the construction of his machine, desires a given power, in order to give practical operation and effect to his discovery. One mechanic may furnish the power by means of a lever, another by means of a screw—two very different instruments—yet, so far as the use of the instruments and so far as their purpose to furnish the power is concerned, they are regarded simply as mechanical equivalents, and the use of one in one machine does not distinguish that machine, from a machine in which the other is found. So, too, a given power may be obtained by a spring or

by a weight, or by a pulley—apparently very different devices. Yet, as they are used for the same purpose, and to accomplish the same end in machinery, they are regarded as substantially identical. It is also proper to state, in this connection, that a patentee is not confined to the precise arrangement, in the construction of his machine, which he has described in his patent. This is obvious from the principles already stated. Formal changes are notning—mere mechanical changes are nothing—all these may be made outside of the description to be found in the patent; and yet the machine, after it has been thus changed in its construction, is still the machine of the patentee, be cause it contains his invention, the fruits of his mind, and embodies the discovery which lie has brought into existence and put into practical operation. A familiar illustration of the principle that I am endeavoring to develop, and one bearing directly upon the issue between the parties here, will be found in the instance of the large core-holder or core described in the plaintiffs' patent. It is said, that the description in the patent is confined to a large core or core-holder. But, admitting this to be so, the change to a small one, if a small one can be used successfully, is but a change in proportions, as the larger includes the smaller one. Any person that could make a large one could make a small one, and could pack it to fit the aperture in the ram just as well as the large one, without anything more than the application of a little common sense, and ordinal skill in the working of the machine.

In addition to these instances which I have given you, in which the patentee is not tied down to the precise description given in his patent, there is another suggestion I wish to make, in connection with this branch of the case, and it is one that commends itself to the common sense of the jury. Any machine which has been constructed as an improvement upon a previous one, or as an entirely new manufacture,

may be very considerably changed in its mechanical arrangement and construction, the description of it may be very much departed from in the construction, and yet it may accomplish the object and purpose for which it was designed. It may not be as perfect, in producing the result intended, but still it may, though changed and varied very much, do its work satisfactorily. It is proper also to remark, that any change or alteration which is suggested to the skilful operator from the working of the machine, and in the course of its operation—any useful change that may be the result of the practical working of the machine—is clearly a change that belongs, not to the operator, but to the original inventor of the improvement. Upon this branch of the case, and in this line of observation, I wish to guard you from falling into any error, because I am desirous that you shall comprehend accurately and clearly the principles of law that properly enter into the examination and decision of this difficult and somewhat metaphysical question. I, therefore, wish to prevent your being misled into extending these principles beyond the fair limit and scope that belong to them. What I mean to say is this—that, in order to ascertain and determine whether the change in the arrangement and construction of an existing machine is to be considered as a substantial change or not, you must ascertain and determine whether the change is the result of mechanical skill, worked out by mechanical devices—of a knowledge that belongs to that department of labor—or whether the change is the result of mind, of genius, of invention, in which you discover something more than mere mechanical skill and ingenuity. A change in the arrangement and construction 714 is not substantial, unless you find embodied in it, over and beyond the skill of the mechanic, that inventive element of the mind which is to be found in every machine or improvement that is the proper subject of a patent. If you find that, then the

change is a substantial one, that entitles the party to a patent. Then it is a change that has added something to the useful knowledge of mankind and to the business interests of the country.

It will be seen, from these observations, that a difference in the mechanical arrangement and construction of the two machines is not necessarily a test by which to determine that the two are not identical. They may be, apparently, very different externally, and still embrace the same substantial identity in principle or mode of operation. So, on the other hand, the converse of the proposition is equally true. The two may, apparently, be very similar externally, and still, in principle and mode of operation, be very different. I do not know any better mode of examining a question of this kind, than to inquire whether the mechanical arrangement and construction of the two embrace the same set of ideas, the same leading features or ideas, which, in practical operation, produce the useful result. In other words, whether the arrangement and combination of the parts of machinery found in each are substantially the same, and operate in substantially the same way in producing the result. Hence, the real question in this case, as it respects the identity of the two machines, looks simply to their mechanical arrangement and construction, as to whether or not the defendants' incorporates, in its structure and operation, the spirit and substance of the plaintiffs' improvement—that is, uses the arrangement and mechanism of the plaintiffs' to perform the same functions or produce the same effect in the same way, or substantially the same way.

I will read to you two passages upon this branch of the case, which embody very fully and clearly the views that I desire to impress upon you, and which, being in the words of another, (Chief Justice Tindal, of the common pleas,) may, perhaps, take hold of your minds more strongly, from the variety of the

illustration, than anything that I have said or could say. In Walton v. Potter, Webst. Pat. Cas. 590, Curt. Pat. § 255, note 1, Chief Justice Tindal remarked: "Now, there can be no doubt whatever, that although one man has obtained a patent for a given object, there are many modes still open for other men of ingenuity to obtain a patent for the same object; there may be many roads leading to one place; and, if a man has, by dint of his own genius and discovery, after a patent has been obtained, been able to give the public, without reference to the former one, or borrowing from the former one, a new and superior mode of arriving at the same end, there can be no objection to his taking out a patent for that purpose. But he has no right whatever to take, if I may so say, a leaf out of his neighbor's book, for he must be contented to rest upon his own skill and labor for the discovery, and he must not avail himself of that which had before been granted exclusively to another; and, therefore, the question again comes around to this—whether you are are of opinion that the subject-matter of this second patent is perfectly distinct from the former, or whether it is virtually bottomed upon the former, varying only in circumstances which are not material to the principle and substance of the invention." I read another passage from the same case. Webst. Pat. Cas. 586, Curt. Pat. § 202, note 1: "Where a party has obtained a patent for a new invention, or a discovery he has made by his own ingenuity, it is not in the power of any other person, simply by varying in form or in immaterial circumstances, the nature or subject-matter of that discovery, to obtain either a patent for it himself, or to use it without the leave of the patentee, because that would be, in effect and in substance, an invasion of the right; and, therefore, what you have to look at upon the present occasion, is not simply whether, in form or in circumstances, that may be more or less immaterial, that which has been

done by the defendants varies from the specification of the plaintiff's patent, but to see whether, in reality, in substance and in effect, the defendants have availed themselves of the plaintiff's invention in order to make that fabric, or to make that article which they have sold in the way of their trade; whether, in order to make that, they have availed themselves of the invention of the plaintiff."

There is one other observation that I desire to make, and that is a practical one, which bears more directly upon the real point in issue between these parties than perhaps any of the general observations to which I have called your attention. You have seen that, after all, the case comes down to this naked question, as it respects this branch of it, and that is, whether or not the defendants' machine embraces, within its arrangement, the combination of the hollow ram and core or core-holder, patented to the plaintiffs. I am bound to say that I do not think the question is simply whether or not the defendants use the hollow ram in combination with the core; because I think that the combination of the hollow ram and the-core or core-holder alone and in the abstract is not the invention or improvement of the plaintiffs. Cylinders, sliding upon rods, had previously existed in mechanical constructions and in practical use, which is all that is found in the combination of the hollow ram and the core or core-holder upon which the hollow ram slides. That alone, and in the abstract, is not the invention of the plaintiffs, and, although the hollow ram and the core in combination may be found in 715 the defendants' machine, that alone will not constitute an infringement. The question, in my judgment, is this. It has been conceded throughout, that the plaintiffs were the first persons who applied this peculiar combination to the purpose of making lead pipe by pressure. They were the first to conceive of the adaptation of this peculiar combination (which of itself was not new)

to the purpose of producing this useful and practical result; and it is in this idea that the novelty of their improvement consists. The point in the case is, whether or not the defendants have applied this combination substantially in the same way for the same purpose. If they have, then they have appropriated the improvement which belongs exclusively to the plaintiffs, and the use of their machine is an infringement of the plaintiffs' patent. To this point you must turn your attention, and upon this, in my judgment, the question on this branch of the case must turn. Have the defendants applied this combination of the hollow ram and the core substantially in the same way that the plaintiffs have applied it, for the purpose of making lead pipe by pressure? If they have, they are guilty of infringing; if they have not, then they are not guilty.

The remarks which I have made to you thus far apply simply to the question of the identity of the mechanical arrangement and construction of the two opposing machines. There is another question involved in the case, which bears upon this, and to which it is necessary to call your attention. The defendants contend that, admitting there is an apparent substantial identity in the arrangement and construction of the two machines, and in their principle of operation, yet, in point of fact, the practical operation and effect of the two upon the mass of lead, in forming the pipe, are essentially different, and that such effect in the defendants' is highly beneficial in the operation of the machine. In other words, that because the defendants' forms the pipe at the point of pressure, at the face of the ram, the operation and effect of the power thus used upon the mass of lead are new. In this view of the case, and in respect to this branch of it, the law looks more to the result of the mechanical arrangement than to the arrangement itself. The new and different effect in the operation of the machine

reflects back upon the mechanical arrangement and construction, and characterizes the change, and may authorize an inference of a substantial change, which the arrangement, disconnected from the new and different effect, would not. Without connecting the new effect with the change, the change might be only formal and unsubstantial. The case of the improvement in the mould-board of the cast-iron plough referred to by some of the learned counsel, illustrates this principle. It was there held, that a change in the shape of the mould-board, though apparently formal and one of proportion, and of itself amounting to nothing, became a substantial change by producing a new and different effect, in its operation, from that which was produced in the previous plough. It must be borne in mind, however, that the new effect, which is to give such materiality and importance to the apparently formal change, must not be looked for in the simple production of a larger quantity of pipe in a given time, or in the reduced amount of power required to operate the machine. All this may depend upon other considerations, as upon superior mechanical skill in the construction and arrangement of the machinery. But the new effect to which I am now calling your attention must be different in kind. The operation and effect upon the lead in the defendants' machine must be new and different from the operation and effect upon the lead in the plaintiffs'. And the capability of the defendants' machine to make a greater quantity of pipe in a given time, or to use a reduced amount of power, must be the result of the new and different operation and effect of the arrangement upon the mass of lead. This principle, which has been brought into the defense in this case, is, in the aspect in which it is presented, a very important one. I am desirous, therefore, that you should thoroughly comprehend it, and also the qualifications which belong to it, and which should be kept in mind in applying it.

It is well known that new machines which have been devised for the purpose of carrying into practical effect an improvement or invention, oftentimes exhibit, when first constructed, and until tested by practical use, great imperfections in their results. It requires time and experience, and the observation derived from the practical working of the machine, to perfect it. Hence, the mere fact that a machine constructed and arranged, apparently or externally, like a previous one, produces a result more beneficial, is not always a safe test to determine that the two are substantially different. The result may be one derived from experience in the use of the previous machine. The new result, in the present case, must be a result derived from a different mechanical operation and effect upon the mass of lead in the cylinder, and not from the same operation and effect. This is a question of fact, and you will readily, from the time that has been consumed upon this branch of the case, call to mind the evidence bearing upon it—first, the examination of the experts on both sides, as regards the difference in the operation and effect of the two machines upon the mass of lead, in producing the pipe—also, the various experiments, many of them exhibited in your presence, others made elsewhere and detailed by the experts, tending, on the one side, to make out this new and different effect upon the mass of lead, in manufacturing pipe, and, on the other side, to discredit and disprove it. The question is thus raised, upon 716 this evidence, for your determination. You must decide on which side the weight of the evidence lies. If it is in favor of the view taken by the defendants, that there is a new and different operation and effect upon the mass of lead in the cylinder, on account of the arrangement in the defendants' machine, then, I think, as a matter of law, that such new operation and effect give character to the mechanical arrangement and afford evidence of a substantial

change. If, on the other hand, you think that the weight of the evidence is with the plaintiffs, and that there is no material or essential difference in the effect and operation of the two machines upon the mass, then you will be obliged to go back to the first question presented to you—whether or not there is, in the defendants' machine, a substantial change in the mechanical arrangement and construction, and in the operation of the same, from the combination, arrangement and operation of the plaintiffs' machine.

One word upon the question of damages. As there has been no serious question made on the subject, I shall simply call your attention to the principle that must govern. It seems that the defendants have made 711,551 pounds of pipe in their machine within the time for which the plaintiffs claim they have been guilty of infringing. The price of lead pipe, during that time, was six cents per pound, except for a small quantity, which was sold at five cents and three quarters per pound. The price of pig lead was about four cents and a half per pound, during the same period. That would make a difference of one cent and a half per pound. But, out of this, the cost of manufacturing the pipe must be taken. What that is, is open to a good deal of observation. One witness states that the plaintiffs could have made it, in very large quantities, for one-eighth of a cent per pound. The rule in these cases is to give the actual damage or loss incurred by reason of the infringement, and that is the profits which the plaintiffs would have made if they had not been embarrassed by the interference of the defendants' machine. Because, the law presumes that the plaintiffs would have had the pattronage which was diverted by the defendants. The profits which the plaintiffs have lost in consequence of the infringement, afford, therefore, a criterion by which to determine the amount of damages they have sustained.

The infringement claimed on the part of the plaintiffs took place between September, 1847, and April, 1848. It is claimed that they are entitled to the damages which they have actually sustained, together with interest upon the same from that time down to the present. My own view of this question is, that the jury, in estimating the damages, may take into account the interest, if they choose, and give it by way of damages. They may take into account in estimating the damages, the fact that the party has been deprived of them from the time the infringement took place down to the present time.

NOTE. The specification of the plaintiffs' patent was as follows:

The schedule referred to in these letters patent, and making part of the same: Be it known that we, George N. Tatham and Benjamin Tatham, Junr., both of the city of Philadelphia, and state of Pennsylvania, have invented certain new and useful improvements in machinery or apparatus for making and manufacturing pipes and tubes of lead, tin and other metallic substances, and their alloys. And we do hereby declare that the following is a full, clear and exact description of the construction and operation of the same, reference being had to the accompanying drawings, making part of this specification: Our invention of these certain improvements applies principally to the 'machinery or apparatus for making or manufacturing pipes and tubes from lead, or a mixture or compound of lead with other metals, as tin, or zinc, or any other compound or alloy of soft metals capable of being squeezed or forced, by means of great pressure, from out of a cylinder or receiver, through or between apertures, dies and cores, when in a solid state,' described and set forth in the specification of a patent granted to Thomas Burr, of Great Britain, and also described in the first volume of the first series of the London Journal of Arts and Sciences, as therein

will appear; and our said invention is applicable in part also to other machinery for manufacturing leaden and other metallic pipes, which will be hereinafter referred to. In the plan described by Thomas Burr, the core (for the formation of the inner diameter or calibre of the pipe) is attached to the end of the piston, and, advancing before it through the cylinder, became bent and twisted out of centre with the dies, thus preventing or destroying the uniformity of thickness or the centrality of the bore of the pipes. This defect resulted from the difference of expansion and contraction, and from the extreme pressure required to drive out the solid metal, and from several other causes, the effect of which was to render that plan ineffective and ineligible. These defects it is the object of our improvements to remedy. Our said improvements may be fully understood by referring to the accompanying drawings, and to the explanations thereof contained in this specification. We use a powerful hydraulic press, which is partially represented at figure 1. In this figure a a, is the cap or top of the press; b b, the base or frame of the bottom thereof, inclosing the great cylinder and the ram, which are not here exhibited. C C C C, are the upright wrought iron pillars of the press. The pipes, the safety-valve and other parts of the hydraulic press are not here represented. This engine is so well known, and may be constructed in such variety of forms, as to render a description of it unnecessary, and the figure in the annexed drawings is intended only to exhibit the relative arrangements of the other parts of the apparatus. We use a strong iron cylinder, constructed in a manner substantially resembling that described by Thomas Burr, and intended for precisely the same purposes. The die is secured at the upper end of the cylinder between a circular plate and the top of the cylinder, in an aperture or recess fitted to receive it. The top of the cylinder is attached by means of

screws or bolts, or otherwise, thereto, so as to be easily removed and replaced. The cylinder, with its several appurtenances, is to be firmly bolted or secured to the top of the hydraulic press. It is represented in perspective at A, in figure 1, and in section at A A, in figure 2. k k, figure 2, is a section of the die, which is a polished steel ring. m. m. is the circular plate with a large aperture through it for the passage of the metal towards 717 the die. n. n. is the top of the cylinder. X X, figure 2. is a section of a part of the top of the hydraulic press, which part has an aperture (i i) in the form of an inverted cone, to allow access to the cylinder, for the purpose of charging it through the dies or other apertures, and for the passage of the pipes or tubes. The aperture is hidden at figure 1. The piston, B B, (operating within the cylinder,) is bored accurately throughout its length, so as to receive and fit a long core-holder, upon which it is to move or slide easily up and down, being at the same time furnished with proper packing. The hollow piston is exhibited in its place, in perspective, at B, figure 1; and in section, at B B, figure 2. Its parts are shown detached at a and b, in figure 5, and a section of the face at C. Its packing (around the long core-holder) consists of tight rings occupying the places indicated at figure 2 by the letters x x; but it may be packed in other ways in common use, and well known to machinists. The face C should be made of cast-steel. It is secured to the body of the piston by means of bolts or screws. The piston is secured in its place, upon the table or platform of the hydraulic press, in any convenient manner. We employ a cast iron fixture, open in front to receive the piston-head, grasping the same, and, being firmly bolted to the table, is strong enough to bear the high degree of force often required to extract the piston from the cylinder, after it has been driven home. This instrument is represented in its place upon the table at O, in figure 1, and in plan at figure 3,

y, and in transverse section at z. We employ a long core-holder, which is a strong round rod of iron or steel, accurately turned and polished, so as to move or slide easily and truly through the hollow piston, fitting the same exactly. One end of this long core-holder is to be securely attached (by a pin or otherwise) to strong iron frame-work, below the table or platform of the press. The core-holder is to be sufficiently long to pass upwards through the table or platform, through the piston, and through the middle of the cylinder, to its discharging end, where it is to hold (in the centre of the die) a core or mandrel, attached, screwed or bolted into its end: or is itself to be tapered, if necessary, to the size required for the interior diameter or calibre of the pipes or tubes. The long core-holder is exhibited in its place at D, figure 1, and in section at D, figure 2. and detached at D, figure 4, where several different plans for its construction next the core are exhibited. The iron framework securing the end of the long core-holder is to be made with several arms, each to be firmly attached to one of the wrought-iron pillars of the hydraulic press. This frame is represented in perspective, in its place, at E E, in figure 1, and in plan, at figure (5, where the relative positions of lie pillars that support the table or platform of the press are exhibited at e, h, g. The lower part of the framework must be placed at such a distance above the hydraulic ram-head as not to interfere with the rising of the same, when the press is in action. This distance should be of the length of the piston at the least. The table or platform of the press is to be supported by strong iron pillars, two, three or four in number, standing between the arms of the framework fixture last described. The table is seen at F P. figure 1. It is to slide upon the wrought-iron pillars of the press, which thus serve as guides to it. The pillars supporting the table are represented at G G G, in figure 1. They are to stand upon the ram-head, which

is a solid iron fixture upon the top of the ram itself, and is seen at H, in figure 1. The ram-head is to contain an aperture large enough to permit the end of the long core-holder to descend into the hollow of the ram, when occasion may require the removal of the piston, or a change in any of the different instruments. The operation of the machinery is, in most respects, the same as that described by Thomas Burr, to whose specification we here particularly refer. The several parts being adjusted in their places, as at figure 1, the piston being lowered, the cylinder is filled with melted metal, through the aperture between the die and the core; or, if preferred, through an aperture made for the purpose in the cylinder, which is to be stopped with a screw-plug or otherwise. The space occupied by the metal in the cylinder is represented in the sectional drawings by a tint of red color. Upon the metal in the cylinder becoming 'set' or solid, the press is to be set in action, and, as the ram of the press rises upwards, carrying with it the pillars, and the table or platform upon them, the piston (sliding upon the stationary long core-holder) is driven into the cylinder, and the metal therein is forced upwards between the core and the die, and issues above the top of the press in the shape of a pipe or tube. Lead perfectly cold, and even harder metal, may be driven by this machinery, and formed into pipes or tubes.

"We do not intend to limit or confine ourselves to the precise plan here above described of forcing the piston upwards into the cylinder, and of causing the pipe to issue above the press, since the same results will be produced when the action of the machinery is reversed, by securing the piston to the under part of the top of the hydraulic press, and bolting the cylinder upon the table or platform; thereby causing the cylinder to advance upon the stationary piston, and forcing the pipe downwards through an aperture in the table made to admit its passage. In this reversed

mode of operation, it would be necessary to construct upright shafts or pillars, standing upon and secured to the table, and made to slide through boxes fitted in the top of the press. These uprights are to be connected above the top of the press, by a strong crossbeam, to the centre of which the end of the long core-holder is to be attached. The core-holder should slide through a box in the top of the press, and also through the stationary hollow piston, and, reaching to the bottom of the cylinder, it must there hold a core or mandrel in the centre of the die, as before described. When the press is set in motion, the core-holder will rise with the upright framework and the cylinder, fixedly preserving its relative position with the die at the bottom of the cylinder. Figure 7 is a representation (partly in section) of this reversed mode of operation. A, is the cylinder reversed, having the die now at the bottom. B, is the hollow piston, secured to the top of the press. G C. are the upright pillars of the framework. D D, is the cross-beam thereof. E, is the long core-holder depending from the crossbeam. In this latter form or manner of arrangement we intend to apply the foregoing improvements to the apparatus for manufacturing pipes or tubes from lead or other metallic substances, invented by Charles and John Hanson, of Great Britain, for which letters patent of the United States were granted to the present inventor, Benjamin Tatham, Junr., and to Henry B. Tatham, of the city of Philadelphia, under assignment from the said Charles and John Hanson, before patent issued, and recorded preparatory thereto, which letters patent are dated the twenty-ninth day of March, eighteen hundred and forty-one. We do not claim as our invention any part of the cylinder, nor of the dies, nor of the arrangement thereof in the cylinder, nor the manner of adapting these to the hydraulic press, nor the mode of operation generally, all of which have been substantially described in the specifications

of the patents of Thomas Burr, and of Benjamin and Henry B. Tatham, assignees of Charles and John Hanson, heretofore referred to. But what we do claim as constituting our invention, and desire to secure by letters patent, are: First. The long core, or core-holder, formed and held stationary with relation to the dies as described. Secondly. We claim the constructing of the piston B, hollow, in the manner described; and the combination of the same with the long core, or core-holder, upon which the piston slides. Thirdly. We claim, as a modification of our invention, the arrangement and 718 combination of the several parts above mentioned as exhibited in what has been termed 'The Reversed Arrangement,' shown at figure 7, in the accompanying drawings."

[1] {Reported by Samuel Blatchford, Esq., and here reprinted by permission.}

[2] {See note at end of case.}