Syllabus.

MORLEY SEWING MACHINE COMPANY *v.* LANCASTER.

APPEAL FROM THE CIRCUIT COURT OF THE UNITED STATES FOR THE DISTRICT OF MASSACHUSETTS.

No. 165. Argued January 11, 1889. — Decided February 4, 1889.

Claims 1, 2, 8 and 13 of letters patent No. 236,350, granted January 4, 1881, to James H. Morley, E. S. Fay and Henry E. Wilkins, on the invention of said Morley, for an improvement in machines for sewing buttons on fabrics, namely, "1. The combination, in a machine for sewing shank-buttons to fabrics, of button-feeding mechanism, appliances for passing a thread through the eye of the buttons and locking the loop to the fabric, and feeding mechanism, substantially as set forth. 2. The combination, in a machine for sewing shank-buttons to fabrics, of a needle and operating mechanism, appliances for bringing the buttons successively to positions to permit the needle to pass through the eye of each button, and means for locking the loop of thread carried by the needle to secure the button to the fabric, substantially as set forth." "8. The combination, in a machine for sewing buttons to fabrics, of button-feeding and sewing appliances, substantially as set forth, and feeding appliances and operating mechanism whereby the feeding devices are moved alternately different distances to alternate short button stitches with long stitches between the buttons, as specified." "13. The combination, with button-sewing appliances, of a trough, appliances for carrying the buttons successively from the trough to the sewing devices, and mechanism for operating said appliances and sewing devices, as set forth," are valid.

The Morley machine contains and is made up of three main groups of instrumentalities: (1) mechanism for holding the buttons in mass, and delivering them separately, in proper position, over the fabric, so that they may be attached to it by the sewing and stitching mechanism; (2) the stitching mechanism; (3) the mechanism for feeding the fabric along, so as to space the stitches and consequently the buttons when sewed on.

A description given of the devices used by Morley, which make up the three mechanisms; and of those used in the alleged infringing machine, (the Lancaster machine,) and making up the same three mechanisms.

The Morley machine was the first one which accomplished the result of automatically separating buttons which have a shank from a mass of the same, conveying them in order to a position where they can be selected by the machine, one after another, and, by sewing mechanism, coupled with suitable mechanism for feeding the fabric, be sewed thereto at prescribed suitable distances apart from each other.

No machine existing prior to Morley's is shown to have accomplished the operation of turning a shank button, the head of which is heavier

than its shank and eye combined, into such a position that a plane passing through its eye shall be perpendicular to a plane passing through the long axis of the sewing needle, so as to insure the passage of the needle through the eye.

The Lancaster machine infringes the Morley patent, although there are certain specific differences between the button-feeding mechanisms in the two machines, and also certain specific differences between their sewing mechanisms.

Morley, having been the first person who succeeded in producing an automatic machine for sewing buttons of the kind in question upon fabrics, is entitled to a liberal construction of the claims of his patent.

Where an invention is one of a primary character, and the mechanical functions performed by the machine are, as a whole, entirely new, all subsequent machines which employ substantially the same means to accomplish the same result are infringements, although the subsequent machine may contain improvements in the separate mechanisms which go to make up the machine.

Morley having been the first inventor of an automatic button-sewing machine, by uniting in one organization mechanism for feeding buttons from a mass, and delivering them one by one to sewing mechanism and to the fabric to which they are to be secured, and sewing mechanism for passing a thread through the eye of the button, and securing it to the fabric, and feeding mechanism for moving the fabric the required distances to space the buttons, another machine is an infringement, in which such three sets of mechanism are combined, provided each mechanism, individually considered, is a proper equivalent for the corresponding mechanism in the Morley patent; and it makes no difference that, in the infringing machine, the button-feeding mechanism is more simple, and the sewing mechanism and the mechanism for feeding the fabric are different in mechanical construction, so long as they perform each the same function as the corresponding mechanism in the Morley machine, in substantially the same way, and are combined to produce the same result.

The defendant employs, for the purposes of his machine, known devices, which, in mechanics, were recognized as proper substitutes for the devices used by Morley, to effect the same results. In this sense the mechanical devices used by the defendant are known substitutes or equivalents for those employed in the Morley machine to effect the same results; and this is the proper meaning of the term "known equivalent," in reference to a pioneer machine such as that of Morley. Otherwise, a difference in the particular devices used to accomplish a particular result in such a machine would always enable a defendant to escape the charge of infringement, provided such devices were new with the defendant in such a machine, because, as no machine for accomplishing the result existed before that of the plaintiff, the particular device alleged to avoid infringement could not have existed or been known in such a machine prior to the plaintiff's invention.

Opinion of the Court.

In equity, for the infringement of letters patent. Decree dismissing the bill, from which the complainants appealed. The case is stated in the opinion.

Mr. Benjamin F. Thurston for appellants.

Mr. J. E. Maynadier and *Mr. George E. Smith* for appellee.

Mr. Justice Blatchford delivered the opinion of the court.

This is a suit in equity, brought November 6, 1882, in the Circuit Court of the United States for the District of Massachusetts, by the Morley Sewing Machine Company and the Morley Button Sewing Machine Company against Charles B. Lancaster, for the alleged infringement of letters patent No. 236,350, granted January 4, 1881, to James H. Morley, E. S. Fay and Henry E. Wilkins, on the invention of said Morley, on an application filed June 23, 1880, for an improvement in machines for sewing buttons on fabrics. The machine of the defendant is constructed in accordance with the description contained in letters patent No. 268,369, granted November 28, 1882, to Joseph Mathison, William D. Allen, and C. B. Lancaster, on the invention of said Mathison, for improvements in machines for securing buttons to material, on an application filed August 1, 1882.

The specification of the Morley patent says: "My invention consists in mechanism for automatically sewing shank-buttons on to fabrics, shoes, etc., and the objects of my invention are to form a double-threaded stitch on the top side of the material being sewed upon, transversely to the direction of feed, and on the reverse side of the material two parallel lines of stitches at right angles to the first named ones, to make alternately long and short stitches, and to so feed buttons to be sewed by said machines as to present them at the proper time and in the proper place to be operated upon." The specification then describes, by reference to twenty-four figures of drawings, the mechanical means used by the patentee to perform the mechanical operations described. The specification then proceeds:

"Having thus described the machine and constructions set forth in the drawings, I wish it to be understood that the same is only one of different mechanisms which I have contemplated, and which may be effectually employed for carrying out the main feature of my invention, to wit, the automatic mechanical sewing of buttons to a fabric. Thus, different means may be adopted for carrying the thread through the eye of the button into the fabric, as, for instance, passing the hooked needle through said eye to a position to seize the thread from the straight needle, or form [from] a suitable carrier, and then draw the loop down through the fabric to be secured beneath by a shuttle or needle thread, or the eye pointed needle may be used in connection with a loop-spreader and shuttle for carrying a thread through the loop, a single thread or two threads being used. It will further be understood that wires may be sometimes substituted for threads, and that other feed mechanisms may be employed, the needles moving with, but not controlling, the fabric, as in the construction described."

There are eighteen claims in the patent, only four of which are relied upon by the plaintiffs, namely, claims 1, 2, 8, and 13, which are as follows: "1. The combination, in a machine for sewing shank-buttons to fabrics, of button-feeding mechanism, appliances for passing a thread through the eye of the buttons and locking the loop to the fabric, and feeding mechanism, substantially as set forth. 2. The combination, in a machine for sewing shank-buttons to fabrics, of a needle and operating mechanism, appliances for bringing the buttons successively to positions to permit the needle to pass through the eye of each button, and means for locking the loop of thread carried by the needle to secure the button to the fabric, substantially as set forth." "8. The combination, in a machine for sewing buttons to fabrics, of button-feeding and sewing appliances, substantially as set forth, and feeding appliances and operating mechanism whereby the feeding devices are moved alternately different distances to alternate short button stitches with long stitches between the buttons, as specified." "13. The combination, with button-sewing appliances, of a trough, appliances for carrying the buttons successively from the trough

to the sewing devices, and mechanism for operating said appliances and sewing devices, as set forth." The defendant's machine is known as the Lancaster machine.

The Morley machine contains and is made up of three main groups of instrumentalities: (1) mechanism for holding the buttons in mass, and delivering them separately, in proper position, over the fabric, so that they may be attached to it by the sewing and stitching mechanism; (2) the stitching mechanism; (3) the mechanism for feeding the fabric along, so as to space the stitches and consequently the buttons when sewed on.

In the button-feeding mechanism, there is a hopper containing the buttons in mass. The principal use of the machine is to sew buttons on to the uppers of buttoned boots, and the button designed to be used is one having a round ball affixed to a shank, which terminates in an eye. On the bottom of the hopper is a hopper-valve, which picks out the buttons one by one and delivers them into an inclined trough. This trough has a V-shaped groove along its bottom, midway between its sides, and the buttons enter the upper part of the trough with their shanks in all directions, and it becomes necessary to turn them over, so that the eyes will lie in the groove while the bodies of the buttons occupy the trough. The contrivance for accomplishing this consists of a flexible, corrugated strip of metal, lying over the top of the trough, and oscillated by proper machinery, which, by contact with the bodies of the buttons, will roll them over so that their eyes will lie in the groove. After the buttons are thus arranged, they slide down the trough, being aided to do so by a jarring motion imparted to the latter. When they arrive at its lower end, which is bent so as to be nearly vertical, they lie with their heads towards the front of the machine, that is, the side farthest from the driving pulley. In one modification of the machine, the buttons are held in the trough by a button-wheel, which is mounted on a vertical axis, and is provided with pockets, each capable of receiving a button, and admits of being intermittently revolved at proper times. This button-wheel is used (1) to close the bottom of the trough; (2) to receive buttons into its pockets; and (3) by its own revolution, to turn

the buttons around, so that their eyes will lie towards the front of the machine. In order to prevent the buttons from falling out of the pockets, the button-wheel rests upon a stationary table, which closes the bottoms of all of the pockets but one. When a button arrives over the notch in the table, it has been turned around, on a vertical axis, 180°; but, as a plane passing through its eye is then vertical, it must be turned on a horizontal axis, through 90°, so that its eye may lie flat, in order that the needle, which ascends from beneath, may pass through the eye. Therefore, when a button arrives over the notch in the table, a plunger or punch descends into the pocket and drives the button into a button-carrier, which lies at that time immediately under the notch, and under the pocket into which the punch enters. When the button enters the carrier, a plane passing through its eye is still vertical, and the carrier therefore turns around, on a horizontal axis, 90°, to bring the eye of the button into such a position that it can be entered by the needle; and, as the carrier turns, it retracts, so as to bring the eye into such a position that a plane passing through it will be horizontal, and the needle will readily enter it. The patent describes a modified form of the contrivances for bringing the button into a position for the needle to enter its eye, in which modification the button-wheel is dispensed with, and a light spring is applied to the bottom of the trough, to hold up the column of buttons, such spring operating as a spring-gate, opened at proper intervals by mechanism, and shutting itself automatically. This mechanism, which also receives the button and turns it around 90° on a horizontal axis, and transfers it to the place where it is to be sewed, is a sort of spring nippers, one of the jaws of which is split so as to receive the shank of the button.

The above contrivances constitute what is called in claim 1, "button-feeding mechanism;" in claim 2, "appliances for bringing the buttons successively to positions to permit the needle to pass through the eye of each button;" in claim 8, "button-feeding appliances;" and, in claim 13, "a trough, appliances for carrying the buttons successively from the trough to the sewing devices, and mechanism for operating said appliances."

In the Morley patent, there is a contrivance for feeding the fabric so as to space the stitches, and consequently to space the buttons. The needles, while inserted in the fabric, move in the direction of the feed, carrying the fabric with them. The motion of the needles or feed is derived from revolving cams, and the two needles swing like an inverted pendulum. This kind of feed was well known in machines for sewing leather, prior to the date of the Morley patent. This feeding contrivance is what is called in claim 1, "feeding mechanism," and in claim 8, "feeding devices."

The Morley patent describes its stitch as being made by means of two needles, one eye-pointed, like the Howe needle, and the other a hooked or crochet needle, such as is used in machines for sewing leather. These needles are set at an inclination to each other, across the line of the seam, and enter the fabric from beneath, and, when they get above it, cross each other. The eye-pointed needle pierces the fabric and carries a bight of thread up above it, and then retreats a little to form a loop by causing the thread to expand away from the needle. During this time, the hooked needle has also penetrated the fabric from beneath, and, when the loop is formed, passes between the eye-pointed needle and the thread, and, as both needles descend, the hook catches the thread supplied by the eye-pointed needle, and carries a bight of thread across the fabric and down through it to the under side, thus forming the transverse stitches on the button side of the fabric, the eye-pointed needle being described as passing through the eye of the button, although it is stated that instead the hooked needle may pass through such eye. The passage of the needle through the eye, after it has passed through the fabric, holds the button upon the fabric. When the eye-pointed needle retracts and forms a loop above the eye of the button, a loop-spreader is employed to spread the loop, and a shuttle, carrying either one thread or two threads, is passed through the loop, the eye-pointed needle, in its retraction, carrying, by means of the loop, the thread or threads furnished by the shuttle, and the stitch being the ordinary lock-stitch. The stitch described in the Morley patent as made by eye-pointed and hooked

needles, both operating from the lower side of the fabric, and making transverse stitches on its upper side and longitudinal stitches on its lower side, is a stitch known prior to the date of the Morley patent.

In the Lancaster machine there are found combined together the same three main groups of instrumentalities above set forth as being found in the Morley patent. There is in the Lancaster machine a hopper containing the buttons in mass, and an inclined surface which supports a column of the buttons, the buttons lying with their shanks up and their bodies down. This hopper is provided with a reciprocating brush, which sweeps over the buttons and rolls them over so that their shanks, pointing upward, will fall into one or another of slits in a metal plate which covers the inclined flat surface. These slits all converge into a single slit, so that the buttons slide down the various slits and ultimately lie in a single column in the single slit, with their shanks upward, upon an inclined plane surface. This single slit, and the plane surface which it covers, are twisted at the end, in such a manner that a plane passing through the slit is nearly horizontal, and the surface which is in contact with the head of the button is nearly vertical. Consequently, when the buttons reach the bottom, they lie in such a position that a plane passing through the eye of the lowermost button is horizontal, or nearly so. The column of buttons is held up by a light spring, and this spring-gate is opened by the button itself, because the so-called trough holding the column of buttons vibrates sidewise, and a thread which passes through the eye of the lowermost button prevents that button from vibrating with the contrivance, and the button is pulled out by the thread, and, in being pulled out, overcomes the resistance of the spring. The eye of the lowermost button in the column lies directly under the needle, so that the needle enters it while it is still in the column. The contrivance containing the column then vibrates sidewise, so as to get out of the way of the needle in a subsequent feeding operation. The spring in the Lancaster machine, which holds up the column of buttons, was a common device in screw blank and eyelet machinery, to hold up a column of blanks and permit them to be removed one by one.

In the Lancaster machine, there is a contrivance for feeding the fabric so as to space the stitches, and consequently to space the buttons, and the machine feeds by means of a single needle which reciprocates in a straight line, and, while it is inserted in the fabric, moves in the direction of the feed, carrying the fabric with it, the motion of the needle or feed being derived from revolving cams. The expert for the defendant says that he finds no substantial difference between the mechanisms which feed the fabric in the two machines.

As to the stitching mechanism of the Lancaster machine, the needle is on the upper side of the fabric, and descends through it. It is an ordinary crochet needle, provided with a cast-off, both the needle and cast-off being like those described in the Morley patent, and the same which had been used for many years in sewing leather. The machine is also provided with a thread-carrier beneath the fabric, like that used in machines for sewing leather. The eye of the button in the Lancaster machine makes a part of the stitch, and the stitch cannot be made unless a button is supplied at every alternate perforation of the needle. It is therefore necessary that the machine should have some contrivance for carrying some of the loops of the thread over the bodies of the buttons, so that the loop may be locked by the eye of the button. In making the stitch, the needle first passes down through the eye of the button, carrying its hook below the fabric. The thread-carrier beneath the fabric then puts a loop of thread into the hook, and the hook rises, pulling a loop of thread through the fabric and through the eye of the button. The needle then descends again, sliding through such loop and piercing the fabric, and leaving the loop on top of the fabric. The thread-carrier then again puts the thread into the hook of the needle, and the needle rises again, carrying another bight of the thread through the fabric and through the loop on top of the fabric, thus locking that loop. As the needle rises, a contrivance seizes both parts of the loop carried up through the second hole made by the needle, opens it wide and passes it over the body of the button, and the part of the loop which is over the button is then pulled down through the fabric, and consequently around

the shank of the button, thus locking the stitch. A succession of these operations forms the stitch, and sews a row of buttons on the fabric, each alternate loop of the stitch being locked by the button itself. If the buttons were removed from the stitch, there would remain a succession of loops, and consequently no seam.

In the operation of the Lancaster machine, after the needle has passed through the eye of the button, the end of the so-called trough and the needle move together, while the needle is making its feeding motion. The so-called trough then stands still until the needle has ascended and pulled a loop of thread through the eye, and has again pierced the fabric. When the needle has got into the fabric the second time the button is pulled out of the end of the trough by the retreat of the trough towards the rear of the machine, and is so pulled out because at that time the fabric is standing still and the button is held to it by the loop of thread which is passed through the eye of the button. After the button is thus pulled out of the end of the trough, the trough stands still for a while, while a loop is passed over the body of the button, as above described, and the trough then returns again, so as to hold the eye of a second button in the path of the descending needle, the button being thus released, not by the motion of the fabric, but by the motion of the trough which carries the column of buttons.

It satisfactorily appears, that the Morley machine was the first one which accomplished the result of automatically separating buttons which have a shank from a mass of the same, conveying them in order to a position where they can be selected by the machine, one after another, and, by sewing mechanism, coupled with suitable mechanism for feeding the fabric, be sewed thereto at prescribed suitable distances apart from each other. The machine performs automatically these three functions of selecting, sewing, and spacing. The problem to be performed was to select from a mass of buttons, furnished with heads and with wire eyes projecting therefrom, single buttons, and to present them in succession to the needle of a sewing mechanism, so that the needle could pass through

the eye and secure it to the fabric. Machinery existed before for selecting from a mass wood-screw blanks, horse nails and pins, and delivering them to other machinery; but, in such constructions, the shank of the article being heavier than its head, the tendency was for the articles to arrange themselves in the way with the shanks downward, the heads being supported on the top surface of the way. With such buttons as are used in the two machines in controversy, as the heads are much heavier than the shanks and the eyes combined, the buttons will not naturally arrange themselves with their shanks downward. It is therefore necessary to have some means for turning each button into such a position that a plane passing through its eye shall be perpendicular to a plane passing through the long axis of the sewing needle, so as to insure the passage of the needle through the eye. No machine existing prior to Morley's is shown to have accomplished that operation.

The substance of the defence in the case is, that there are certain specific differences between the button-feeding mechanisms in the two machines, and also certain specific differences between their sewing mechanisms; and hence that there is no infringement. This was the view taken by the Circuit Court in its opinion, 23 Fed. Rep. 344.

Morley, having been the first person who succeeded in producing an automatic machine for sewing buttons of the kind in question upon fabrics, is entitled to a liberal construction of the claims of his patent. He was not a mere improver upon a prior machine which was capable of accomplishing the same general result; in which case, his claims would properly receive a narrower interpretation. This principle is well settled in the patent law, both in this country and in England. Where an invention is one of a primary character, and the mechanical functions performed by the machine are, as a whole, entirely new, all subsequent machines which employ substantially the same means to accomplish the same result are infringements, although the subsequent machine may contain improvements in the separate mechanisms which go to make up the machine.

In *McCormick* v. *Talcott*, 20 How. 402, 405, the inquiry

was, whether McCormick was the first person who invented, in a reaping machine, the apparatus called a divider, performing the required functions, or whether he had merely improved an existing apparatus, by a combination of mechanical devices which performed the same functions in a better manner. This court, speaking by Mr. Justice Grier, said: "If he" (the patentee) "be the original inventor of the device or machine called the divider, he will have a right to treat as infringers all who make dividers operating on the same principle, and performing the same functions by analogous means or equivalent combinations, even though the infringing machine may be an improvement of the original, and patentable as such. But if the invention claimed be itself but an improvement on a known machine by a mere change of form or combination of parts, the patentee cannot treat another as an infringer who has improved the original machine by use of a different form or combination, performing the same functions. The inventor of the first improvement cannot invoke the doctrine of equivalents to suppress all other improvements which are not mere colorable invasions of the first."

So, also, in *Railway Co.* v. *Sayles*, 97 U. S. 554, 556, this court, speaking by Mr. Justice Bradley, said, in regard to brakes for eight-wheeled railroad cars: "Like almost all other inventions, that of double brakes came when, in the progress of mechanical improvement, it was needed; and being sought by many minds, it is not wonderful that it was developed in different and independent forms, all original, and yet all bearing a somewhat general resemblance to each other. In such cases, if one inventor precedes all the rest, and strikes out something which includes and underlies all that they produce, he acquires a monopoly, and subjects them to tribute. But if the advance towards the thing desired is gradual, and proceeds step by step, so that no one can claim the complete whole, then each is entitled only to the specific form of device which he produces, and every other inventor is entitled to his own specific form, so long as it differs from those of his competitors, and does not include theirs. These general principles are so obvious, that they need no argument or illustration to support them."

Opinion of the Court.

The same view was directly applied in *Clough* v. *Barker*, 106 U. S. 166, 177, to the Clough patent for an improvement in gas-burners. The first claim of that patent was for "the bat-wing burner, perforated at the base, in combination with the surrounding tube, substantially as described." The second claim read thus: "In combination with the bat-wing burner, perforated at the base, and surrounding-tube, the tubular valve for regulating the supply of external gas to the burner, substantially as described." It appeared that in no prior structure had a valve arrangement been applied to regulate the flow of gas in such a combination as that covered by the first claim of the patent. It was, therefore, held, that the patentee was entitled to the benefit of the doctrine of equivalents, as applied to the combination covered by the second claim. In the defendant's burner, the regulation was made by a tubular valve on the outside of the perforations, instead of on the inside, as in the patent, but performing its work by being screwed up or down, as in the patent. This court said: "Although in the Clough structure the burner and surrounding-tube revolve together in adjusting their position in reference to that of the tubular valve, so as to let in or turn off the supply of gas through the perforations, and although in the Clough structure the flame revolves by the revolution of the burner, and although in the defendant's burners the revolution of the surrounding-tube regulated the supply of gas through such perforations, and neither the burner nor the flame revolved, the defendant's valve arrangement must be held to have been an equivalent for that of Clough to the full extent to which that of Clough goes, involving, perhaps, patentable improvements, but still tributary or subject to the patent of Clough. It is true that that patent describes the tubular valve as being inside of the burner-tube. But Clough was the first person who applied a valve regulation of any kind to the combination to which he applied it, and the first person who made such combination; and he is entitled, under decisions heretofore made by this court, to hold as infringements all valve regulations, applied to such a combination, which perform the same office in substantially the same way as, and were known

equivalents for, his form of valve regulation." See, also, *Duff* v. *Sterling Pump Co.*, 107 U. S. 636, 639.

The same doctrine was applied by this court in *Consolidated Valve Co.* v. *Crosby Valve Co.*, 113 U. S. 157, to the Richardson patent, the claim of which was, "A safety valve with the circular or annular flange or lip *cc*, constructed in the manner, or substantially in the manner, shown, so as to operate as and for the purpose herein described." It appeared that Richardson was the first person who made a safety valve which, while it automatically relieved the pressure of steam in the boiler, did not, in effecting that result, reduce the pressure to such an extent as to make the use of the relieving apparatus practically impossible, because of the expenditure of time and fuel necessary to bring up the steam again to the proper working standard; and that his valve was the first which had a strictured orifice leading from the huddling chamber to the open air, to retard the escape of the steam, and to enable the valve to open with increasing power against the action of the spring, and to close suddenly, with small loss of pressure in the boiler. It was held, that that claim covered a valve in which were combined an initial area, an additional area, a huddling chamber beneath the additional area, and a strictured orifice such as that above mentioned, the orifice being proportioned to the strength of the spring. It was also held, that, under the claim of a second patent, namely, "The combination of the surface beyond the seat of the safety-valve, with the means herein described for regulating or adjusting the area of the passage for the escape of steam, substantially as and for the purpose described," the patentee was entitled to cover the combination, with the surface of the huddling chamber and the strictured orifice, of a screw-ring to be moved up or down to obstruct such orifice more or less, in the manner described. It was further held, that both of the patents were infringed by a valve which produced the same effects in operation by the means described in Richardson's claims, although the valve proper was an annulus, and the extended surface was a disc, inside of the annulus, the Richardson valve proper being a disc, and the extended surface an annulus surrounding the disc; and although the valve

proper of the defendant had two ground joints, and only the steam which passed through one of them passed through the stricture, while, in the Richardson valve, all the steam which passed into the air passed through the stricture; and although in the defendant's valve the huddling chamber was at the centre, instead of at the circumference, and was in the seat of the valve, under the head, instead of in the head, and the stricture was at the circumference of the seat of the valve, instead of being at the circumference of the head. These conclusions were based on the fact, stated in the opinion of the court, that no prior structure was known or recognized as producing any such result as that produced by Richardson's apparatus; that the prior structures never effected the kind of result attained by his apparatus, because they lacked the thing which gave success; and that, taught by Richardson, and by the use of his apparatus, it was not difficult for skilled mechanics to take the prior structures and so arrange and use them as to produce more or less of the beneficial results first made known by him.

The doctrine thus applicable to a machine patent is of a kindred character with that applied, in this country and in England, to a patent for a process.

In *Tilghman* v. *Proctor*, 102 U. S. 707, the claim of Tilghman's patent was for "the manufacturing of fat-acids and glycerine from fatty bodies by the action of water at a high temperature and pressure." In the opinion of this court delivered by Mr. Justice Bradley, the claim was sustained as a claim for a process, irrespective of the particular mode or form of apparatus for carrying it into effect, inasmuch as the patent described a practical and useful mode of carrying it into effect. It was said in the opinion, (p. 721:) "Had the process been known and used before, and not been Tilghman's invention, he could not then have claimed anything more than the particular apparatus described in his patent; but being the inventor of the process, as we are satisfied was the fact, he was entitled to claim it in the manner he did." It was also held that, in such a case, a person who subsequently discovers a new mode of carrying out the patented process is not entitled to use the process without the consent of the patentee.

Reference was made in the opinion in that case to the decision in *Neilson* v. *Harford*, 1 Webster Pat. Cas. 295, which related to Neilson's patent for the process of applying a blast of heated air to anthracite coal in a smelting furnace, by forcing such blast through a vessel situated between the blowing apparatus and the furnace, and heated to a red heat, the form of the heated vessel being stated by the patent to be immaterial. On this question this court said: "That a hot blast is better than a cold blast for smelting iron in a furnace, was the principle or scientific fact discovered by Neilson; and yet, being nothing but a principle, he could not have a patent for that. But having invented and practically exemplified a process for utilizing this principle, namely, that of heating the blast in a receptacle between the blowing apparatus and the furnace, he was entitled to a patent for that process, although he did not distinctly point out all the forms of apparatus by which the process might be applied, having, nevertheless, pointed out a particular apparatus for that purpose, and having thus shown that the process could be practically and usefully applied. Another person might invent a better apparatus for applying this process than that pointed out by Neilson, and might obtain a patent for such improved apparatus; but he could not use the process without a license from Neilson. His improved apparatus would, in this respect, stand in a relation to the process analogous to that which an improvement on a patented machine bears to the machine itself."

In regard to the case of *Neilson* v. *Harford*, this court, speaking by Chief Justice Taney, in *O'Reilly* v. *Morse*, 15 How. 62, 115, 116, said, in reference to the opinion of the Court of Exchequer in that case, delivered by Baron Parke: "We see nothing in this opinion differing in any degree from the familiar principles of law applicable to patent cases. Neilson claimed no particular mode of constructing the receptacle, or of heating it. He pointed out the manner in which it might be done; but admitted that it might also be done in a variety of ways, and at a higher or lower temperature, and that all of them would produce the effect in a greater or less degree, provided the air was heated by passing through a

heated receptacle. And hence it seems that the court at first doubted whether it was a patent for anything more than the discovery that hot air would promote the ignition of fuel better than cold. And if this had been the construction, the court, it appears, would have held his patent to be void, because the discovery of a principle in natural philosophy or physical science is not patentable. But after much consideration, it was finally decided that this principle must be regarded as well known, and that the plaintiff had invented a mechanical mode of applying it to furnaces; and that his invention consisted in interposing a heated receptacle between the blower and the furnace, and by this means heating the air after it left the blower and before it was thrown into the fire. Whoever, therefore, used this method of throwing hot air into the furnace used the process he had invented, and thereby infringed his patent; although the form of the receptacle or the mechanical arrangements for heating it might be different from those described by the patentee. For, whatever form was adopted for the receptacle, or whatever mechanical arrangements were made for heating it, the effect would be produced in a greater or less degree, if the heated receptacle was placed between the blower and the furnace, and the current of air passed through it. Undoubtedly, the principle that hot air will promote the ignition of fuel better than cold, was embodied in this machine. But the patent was not supported because this principle was embodied in it. He would have been equally entitled to a patent if he had invented an improvement in the mechanical arrangements of the blowing apparatus, or in the furnace, while a cold current of air was still used. But his patent was supported because he had invented a mechanical apparatus by which a current of hot air, instead of cold, could be thrown in. And this new method was protected by his patent. The interposition of a heated receptacle, in any form, was the novelty he invented."

This court also said, in *Tilghman* v. *Proctor*, (p. 728:) "If the mode of applying the process is not obvious, then a description of a particular mode by which it may be applied is sufficient. There is, then, a description of the process and of

one practical mode in which it may be applied. Perhaps the process is susceptible of being applied in many modes and by the use of many forms of apparatus. The inventor is not bound to describe them all, in order to secure to himself the exclusive right to the process, if he is really its inventor or discoverer. But he must describe some particular mode, or some apparatus, by which the process can be applied with at least some beneficial result, in order to show that it is capable of being exhibited and performed in actual experience."

The English doctrine is to the same effect. In the case of *Curtis* v. *Platt*, before Vice-Chancellor Wood, in 1863, reported in a note to *Adie* v. *Clark*, 3 Ch. Div. 134, the Vice-Chancellor said, (p. 136,) in regard to a patent for an improvement in spinning-mules: "When the thing is wholly novel, and one which has never been achieved before, the machine itself which is invented necessarily contains a great amount of novelty in all its parts; and one looks very narrowly and very jealously upon any other machines for effecting the same object, to see whether or not they are merely colorable contrivances for evading that which has been before done. When the object itself is one which is not new, but the means only are new, one is not inclined to say that a person who invents a particular means of doing something that has been known to all the world long before has a right to extend very largely the interpretation of those means which he has adopted for carrying it into effect." In the same case, on appeal before the Lord Chancellor, (Lord Westbury,) (p. 138,) the views of Vice-Chancellor Wood were concurred in.

In *Bädische Anilin und Soda Fabrik* v. *Levinstein*, 24 Ch. Div. 156, 171, in regard to a patent for improvements in the production of coloring matters for dyeing and printing, Mr. Justice Pearson said: "Where a patent is taken out for a process for arriving at a known result, (I mean, a result known before the patent is taken out for the process *simpliciter*,) any other person may take out a patent for another process, or may use another process without taking out a patent, without any infringement of the process first taken out. But when a patent is taken out for a new result not known before, and there is one

process described in the patent which is effectual for the purpose of arriving at that new result at the time when the patent is taken out, the patentee is entitled to protection against all other processes for the same result; and no person can, without infringing upon his patent, adopt simply a different process for arriving at the same result." As authority for this view, he cites the cases of *Jupe* v. *Pratt*, 1 Webster Pat. Cas. 146; *Household Co.* v. *Neilson*, 1 Webster Pat. Cas. 685; and *Curtis* v. *Platt*, *ubi supra*, and Goodeve Pat Cas. 102. He decided in favor of the plaintiff.

On appeal to the Court of Appeal, 29 Ch. Div. 366, the decree was reversed, Lords Justices Bowen and Fry being in favor of a reversal, and Lord Justice Baggallay against it. On further appeal to the House of Lords, 12 App. Cas. 710, the decision of the Court of Appeal was reversed, and the decision of Mr. Justice Pearson was restored, Lord Halsbury, (Lord Chancellor,) Lord Herschell, and Lord Macnaghten sitting in the case and concurring. In the judgment given by Lord Herschell it is stated that all the judges of all the courts were agreed on the question of infringement.

A recent and instructive case is that of *Proctor* v. *Bennis*, 36 Ch. Div. 740, in regard to a patent for self-acting mechanism for supplying fuel at intervals to, and distributing it over the surface of, a fire. The court of first instance held the patent to be valid and to have been infringed. In the Court of Appeal, Lords Justices Cotton, Bowen, and Fry unanimously affirmed the decision, and held that a patent for a combination of known mechanical contrivances, producing a new result, was infringed by a machine producing the same result by a combination of mechanical equivalents of such contrivances, with some alterations and omissions, which did not prevent the new machine from being one which took the substance and essence of the patented invention; but that, where the result was old, and the novelty consisted only of improvements in a known machine for producing a known result, the patentee must be tied down strictly to the mode which he had described of effecting the improvements.

Lord Justice Cotton, after referring to the case of *Curtis* v.

Platt, 3 Ch. Div. 135, note, said, (p. 757:) "Where there is no novelty in the result, and where the machine is not a new one, but the claim is only for improvements in a known machine for producing a known result, the patentee must be tied down strictly to the invention which he claims, and the mode which he points out of effecting the improvement. But here the throwing coal on to the furnace by the intermittent radial action of a flap or door was new. Nothing of the kind had been done before. It is true, there had previously been imperfect machines for feeding furnaces automatically, but that had not, previously to this machine, been done by any intermittent radial action of a flap or door, as is done by the plaintiff. In my opinion, therefore, the opinions expressed by the judges with reference to mere improvements in an old machine for an old purpose cannot apply to a case like this, where there was not only novelty in the machine, but novelty in the result to be produced by that machine."

Lord Justice Bowen said, (p. 764:) "Now, I think it goes to the root of this case to remember that this is, as was described by one of the counsel, really a pioneer invention; and it is by the light of that, as it seems to me, that we ought to consider whether there have been variations or omissions, and additions, which prevent the machine which is complained of from being an infringement of the plaintiff's. With regard to the variations, I take precisely the same view that the Lord Justice Cotton has taken; and I will not travel over the ground again. With regard to the additions and omissions, it is obvious that additions may be an improvement, and that omissions may be an improvement; but the mere fact that there is an addition, or the mere fact that there is an omission, does not enable you to take the substance of the plaintiff's patent. The question is not whether the addition is material, or whether the omission is material, but whether what has been taken is the substance and essence of the invention. That seems to me to be the true test, as propounded by the House of Lords in *Clark* v. *Adie*, 2 App. Cas. 315, 320."

Lord Justice Fry said, (p. 766:) "The pith and substance of the plaintiff's invention is, in my judgment, putting coals upon

a fire by an intermittent radial action, an invention which, it may be remarked, reproduces with great exactitude the action of the human arm in placing coals upon a fire." Also, (p. 768:) "In the present case, we have these broad features of likeness, that in both machines the motion is a radial motion, in both machines it is an intermittent motion, in both machines it is of course produced by means of a radius, in both machines that radius is moved in one direction by tappets, and the same radius is moved in the opposite direction by a spring. All those broad features of the machines are in common; but there is this difference, that in the plaintiff's machine a shaft is impelled by the tappets and by the spring, whereas in the defendant's machine the radius itself is impelled by the tappets and the spring. It follows that the radius in the plaintiff's is attached to the shaft, whereas the radius in the defendant's works on a pin. That is the broad distinction between them. The result, however, appears to me to be substantially the same; by substituting the pin for the shaft as the centre on which the radius acts, and by impelling the radius itself instead of impelling the shaft fixed to the radius, you have produced in substance precisely the same radial action by the same means. You drive your radius in one direction by tappets, and you drive it in the other direction by the spring, and you produce the same result, namely, the feeding of coal by a radial motion made intermittent in one direction by the operation of the tappets, and in the other direction by the spring. I think, therefore, that we have a new combination for a new object, and that the gist of that combination has been taken by the defendant, and that, consequently, there is an infringement."

Applying these views to the case in hand, Morley having been the first inventor of an automatic button-sewing machine, by uniting in one organization mechanism for feeding buttons from a mass, and delivering them one by one to sewing mechanism and to the fabric to which they are to be secured, and sewing mechanism for passing a thread through the eye of the button, and securing it to the fabric, and feeding mechanism for moving the fabric the required distances to space the

buttons, another machine is an infringement, in which such three sets of mechanism are combined, provided each mechanism, individually considered, is a proper equivalent for the corresponding mechanism in the Morley patent; and it makes no difference that, in the infringing machine, the button-feeding mechanism is more simple, and the sewing mechanism and the mechanism for feeding the fabric are different in mechanical construction; so long as they perform each the same function as the corresponding mechanism in the Morley machine, in substantially the same way, and are combined to produce the same result.

The view taken on the part of the defendant, in regard to the question of infringement, is that, inasmuch as the Lancaster machine uses different devices in its mechanisms which correspond to those referred to in the first, second, eighth and thirteenth claims of the patent, those claims are to be limited to the special devices described in the patent, which make up such combinations, although both machines contain the same main group of instrumentalities which, when combined, make up the machine.

But, in a pioneer patent, such as that of Morley, with the four claims in question such as they are, the special devices set forth by Morley are not necessary constituents of the claims. The main operative features of both machines are the same. In each there is a receptacle for shank-buttons in a mass; in each the mass of buttons passes in order into a conveyer-way; and in each the buttons conveyed to the sewing mechanism are presented successively with their shanks in a horizontal position, so as to allow of the passage of the needle through the eye. In the Morley machine, the buttons are carried along the raceway with their shanks downward, and are turned over by proper devices, so that the needle can enter the eye. In the Lancaster machine, the buttons travel along the raceway with their shanks upward, and the twisted shape of the raceway causes the buttons to be presented properly in succession to the needle. The only difference is, that in the Morley machine there is an active operating device for turning the buttons, in the shape of a button-wheel which receives them,

and shuts off the column, and takes one at a time out of the raceway; while in the Lancaster machine there is a passive device for accomplishing the same result of turning the buttons, and there is no button-wheel, but there is a spring-gate at the end of the raceway, which shuts off the column and, with the addition of other devices, allows one button at a time to be withdrawn from the raceway. But in the Morley patent a modification is described, whereby the button-wheel is dispensed with, and a spring-gate, as in the Lancaster machine, is employed, and an active device is used to open the spring-gate and discharge the button, while in the Lancaster machine an active instrumentality is used to effect the same result, in combination with the sidewise movement of the raceway and in connection with the fact that the needle enters the eye of the button and passes a thread through it.

As to the mechanism for feeding the fabric, it is substantially the same in the two machines, for in each the needle operates to feed the fabric, while inserted in it, and it makes no difference that in the Morley machine the two needles swing like an inverted pendulum, while in the Lancaster machine the single needle swings in a straight line.

The principal difference relied on by the defendant is in regard to the sewing or stitching mechanism, based upon the difference in the kind of stitch used in the two machines for fastening the button to the fabric. The two stitches are, indeed, different, specifically considered. Morley uses the chain stitch. In the Lancaster machine, the stitch is made by looping the thread upon itself, and putting the bight of the loop around the shank of the button, so as to prevent the loop from pulling out, as it would otherwise do. The Morley patent, however, is not for any particular kind of stitch, or for any particular kind of mechanism for making such stitch. When the form of the stitch is changed, the instrumentalities for making it must change. Morley says, in his specification, that different means for making a stitch may be employed, as well as other feed mechanisms.

The contention of the defendant, in regard to the sewing mechanism, rests upon the proposition, that the convolution

or concatenation of thread which makes up the stitch in the Lancaster machine is different from that which is found in the Morley machine. In each machine, however, the buttons are spaced at the proper distances apart by the feeding mechanism which moves the fabric along, and the feeding device is moved alternately different distances, to alternate short stitches with long stitches between the buttons. In each machine, the button is taken possession of by the sewing mechanism, and the needle in each enters the eye of the button. In the Lancaster machine, however, the thread is so looped as to embrace also the shank of the button, and thus, if the button were not present in the Lancaster machine, the lock-stitch would not be formed, but merely a succession of loops, which could be pulled out of the fabric. But this convolution or concatenation of the thread to form the fastening of the stitch, and the particular device which forms such convolution or concatenation, are not made, by the Morley patent, elements which enter into the claims in question.

Those claims are not for a result or effect, irrespective of the means by which the effect is accomplished. It is open to a subsequent inventor to accomplish the same result, if he can, by substantially different means. The effect of the rule before laid down is merely to require that, in determining whether the means employed in the Lancaster machine are substantially the same means as those employed in the Morley machine, the Morley patent is to receive a liberal construction, in view of the fact that he was a pioneer in the construction of an automatic button-sewing machine, and that his patent, especially in view of the character and terms of the four claims in question, is not to be limited to the particular devices or instrumentalities described by him, used in the three main elements of his machine, which, combined together, make it up. This is the principle applied by this court in *Consolidated Valve Co.* v. *Crosby Valve Co.*, 113 U. S. 157.

In all three of the main mechanisms used in the Lancaster machine, the means employed in it are substantially equivalents of those employed in the Morley machine. There is in each a hopper containing the mass of buttons, and an inclined con-

veyer-way leading from the hopper to the sewing mechanism. The only question in regard to the button-feeding mechanism is, whether the means employed in the Lancaster machine for turning the buttons so that the eyes will come into the path of the needle, are within the means employed for the same purpose in the Morley machine. In the Morley machine there is a flexible, corrugated strip of metal, which is oscillated to and fro, and operates to roll the buttons over, so that their shanks will occupy a groove at the bottom of the trough. In the Lancaster machine, the reciprocating brush which sweeps over the bottom of the hopper in which the buttons lie in a mass, operates in an equivalent way with the corrugated strip of the Morley machine, and causes the shanks, which stand upward, of the buttons which have been rolled over by its action, to enter slits in a metal plate, which converge in the single conveyer-way. The only difference is that, in the Morley machine, the shanks are caused to lie in one direction at one time in their path, and in the Lancaster machine the same result is accomplished by equivalent devices at another time.

As to the instrumentalities employed in the two machines for bringing the buttons one by one so that their eyes will stand in a horizontal position, ready to receive the needle, the buttons in the Morley machine pass down the conveyer-way with their eyes pointing downward, and occupying the groove, and from the conveyer-way they enter one by one into a button-wheel, which, by revolving, turns them 180°, and they are then received into a carrier which further turns them 90°, so as to get the eye into a horizontal plane. In the Lancaster machine it is not necessary to turn the buttons more than 90°, because they have been so rolled over by the brush in the hopper that their eyes point upward and enter the slits, and the conveyer-way is twisted and so turns the button that its eye will occupy a horizontal plane, ready to receive the needle. Then the needle, entering the eye of the button, pulls the button out of the conveyer, and the latter moves out of the way, leaving the button in the possession of the sewing mechanism.

These instrumentalities are the equivalents of each other, the differences being merely formal, active instrumentalities

being employed in one case to turn the buttons, and in the other that end being accomplished by the twisting of the conveyer-way. To employ a curved path to change the plane occupied by a body passing along that path was well known in mechanics, and is a device shown in the Morley patent for turning the buttons from a nearly vertical position to a horizontal position, by a corresponding variation in the inclination of the conveyer-way. The only difference in the particular devices in the two machines in this respect results from the fact that in the Morley machine the buttons pass from the hopper with their shanks downward, while in the Lancaster machine they pass with their shanks upward. From this it results that, while the means employed in the two machines are substantially the same, to effect the same result, active agents can be used in the one case, while passive agents are used in the other, to effect the same turning of the button. Indeed, in the modified form of construction suggested in the Morley specification, there is a spring-gate for holding the buttons up, while in the Lancaster machine there is a similar spring, the only difference being that in the Morley machine the spring-gate is opened by a special device, while in the Lancaster machine the button itself opens the spring when the button-holding contrivance moves out of the way. In that modification of the Morley arrangement, as the specification states, the button-wheel and the plunger are dispensed with, and it is not necessary to turn the button 180° on a vertical axis. So, in this respect, the only difference between the two machines is, that in the Morley machine the spring-gate is opened by an active device, while in the Lancaster machine the conveyer-way is moved sidewise by an active device, leaving the button behind, which opens the spring-gate because the needle has entered the eye of the button.

In regard to the sewing mechanism in the two machines, a sewing needle with thread is employed in each to fasten the buttons to the fabric. In each, the thread is continuous, and follows the fabric as that is moved along by the mechanism which feeds it. The Morley machine employs the common stitch. In the Lancaster machine there is a peculiar stitch, in

which a loop is drawn around the shank of the button and thus the stitch is locked against being drawn out; but notwithstanding the new convolution or concatenation of thread used in the Lancaster machine to secure the shank of the button to the fabric, the sewing mechanism of that machine is a substantial equivalent for the corresponding mechanism of the Morley patent. The invention of Morley in that respect did not consist in the peculiarity of the stitch, but in the combination of the needle, and the mechanism for operating it, with a button having a shank and an eye, the eye being held in a horizontal plane in the path of the needle, so that the thread carried by the needle could secure the button to the fabric. It is immaterial, in so securing the button, whether or not a loop is passed over the head of the button. The defendant's device and arrangement may be an improvement, and the subject of a patent, but nevertheless the use of it involves the plaintiff's invention.

It may be true that the defendant's peculiar form of stitch was unknown before; and it may also be true that his arrangement for carrying the buttons with their eyes upward, and turning the eyes into a horizontal plane by the twisting of the conveyer-way, was not before known. Of course, they were not before known in a machine for automatically sewing buttons to a fabric, because Morley's machine was the first to do that. But still, the defendant employs for the above purposes known devices, which, in mechanics, were recognized as proper substitutes for the devices used by Morley to effect the same results. Thus, in the Lancaster machine, the brush for rolling over the buttons is the obvious equivalent of the corrugated plate in the Morley machine. The mode of operation used in the Lancaster machine for rolling over the buttons so that their shanks shall point in a particular direction before entering the main conveyer-way is the same mode of operation found in the Morley machine, where the corrugated plate rolls the buttons over during their passage to the grooved conveyer-way, so that their shanks shall all point in the same direction. In the Lancaster machine the action resulting from the twisted way is a mechanical equivalent for the button-wheel, the

punch, and the carrier used in the Morley machine to turn the eye into the proper plane for the needle to enter it; and the specific difference in the devices in this respect becomes less when the modification described in the Morley patent is used, so that in each of the two machines the button is turned only 90° on a horizontal axis, and in each of them a spring-gate is employed, opened in the one case by an active device, while in the other case an active device moves the conveyer away from the particular button which is being held by the needle.

In this sense the mechanical devices used by the defendant are known substitutes or equivalents for those employed in the Morley machine to effect the same result; and this is the proper meaning of the term "known equivalent," in reference to a pioneer machine such as that of Morley. Otherwise, a difference in the particular devices used to accomplish a particular result in such a machine would always enable a defendant to escape the charge of infringement, provided such devices were new with the defendant in such a machine, because, as no machine for accomplishing the result existed before that of the plaintiff, the particular device alleged to avoid infringement could not have existed or been known in such a machine prior to the plaintiff's invention.

It results from these views that the decree of the Circuit Court must be

Reversed, and the case be remanded to that court with a direction to enter a decree in favor of the plaintiffs, sustaining the validity of claims 1, 2, 8, and 13 of the plaintiffs' patent, and adjudging that those claims have been infringed by the defendant, and ordering a reference to a master to take an account of profits and damages in respect to such infringement, and awarding to the plaintiffs a perpetual injunction in respect to the four claims above mentioned; and to take such further proceedings as shall be according to law and not inconsistent with this opinion.